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BASIC SUPERPHOSPHATE: ITS PREPARATION AND USE AS A MANURE.

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THE manufacture of superphosphate in this country may be considered to have commenced in 1842, when the late Sir John Bennett Lawes, F.R.S., obtained a patent for treating ground mineral phosphates with sulphuric acid.

The chemical theory then ennunciated may be briefly expressed, namely, that the agricultural value of phosphate manures depended upon the extent to which the phosphoric acid they contained was rendered soluble in water through the aid of sulphuric acid.

It was contended that this solubility in water insured the most complete diffusion through the soil that could possibly be obtained, and this theory in itself is still regarded as correct.

At first the treatment of ground coprolites with commercial sulphuric acid was carried on in a cautious manner; only a portion of the phosphates, amounting perhaps to 20 per cent., was converted into what was known as soluble phosphates; and frequeutly as much as 8 to 10 per ceut. was still left as undissolved phosphates.

The manure so produced was in an excellent dry condition. Indeed in those days complaints respecting damp condition were of rare occurrence.

When acid, however, became cheaper, as the result of improved manufacture, and as competition increased, the utmost amount of soluble phosphate was got out of the manure, so that only 2 or 3 per cent. of phosphate was left in a condition not soluble in water.

Superphosphates then became damper and more acid, so that complaints respecting the condition were of frequent occurrence, because the farmer could not obtain uniform distribution from the manure clogging in the drill.

Superphosphate when first introduced was chiefly applied as a manure for root crops, such as turnips and swedes, which were usually raised on good arable land containing a fair quantity of lime.

Indeed as early as 1863 the late Dr. Augustus Voelcker, writing in the journal of the Royal Agricultural Society upon "Phosphatic Manures for Root Crops," writes:—

"Superphosphates of lime applied to root crops has a different practical effect on different soils.

"The more rapidly and completely the soluble phosphate in commercial superphosphate and turnip manures is precipitated and rendered insoluble in the soil, the more energetic will be its effect upon the turnip crop.

"Purely mineral superphosphates fail to produce good turnip crops on light sandy soils.

"Bone dust partially dissolved by acid is a better manure on light soil than a purely mineral, superphosphate.

"It has indeed been observed that the exclusive use of superphosphate, however beneficial it may be in the majority of instauces, has in some soils led to complete or partial failure or the presence of disease in the turnip crop.

"The reconversion of soluble into insoluble phosphate perhaps may appear undesirable, but in reality it is not only beneficial, but absolutely necessary to healthy and luxuriant development both of turnips and of all other crops to which superphosphate is applied.

"No acid combination as such can enter into plants without doing them serious damage; even free vegetable acids, such as humic and ulmic acids,

are injurious to all crops cultivated for food for the use of man or beast: and unless these acids, which are always present in what practical men call sour humus, are neutralised by lime, or marl, or earth, none but the roughest and most innutritious herbage can be grown.

"Free mineral acids are, I believe, still more injurious to all farm crops, and perhaps to all plants, than the free organic acids that are found in humus.

"A very dilute solution of sulphuric acid—say 1 part in 1,000 of water—may be used with advantage for killing grass in gravel walks made with flint or quartz sand; after one or two applications the weeds will be destroyed and will not reappear for a long time.

"But if the walks are made with limestone gravel, the application of a much stronger acid has little or no effect on the grass or weeds; after some time the latter indeed seem to grow all the better for having had a taste of dilute sulphuric acid.

"In reality, however, no acid enters these plants, but on coming into contact with the limestone gravel unites with the lime to form that useful fertilizer sulphate of lime or gypsum."

The above paragraphs express the opinion of one who was rightly regarded as an authority upon the properties and application of artificial manures.

In 1875 the Aberdeenshire experiments, conducted by Professor Jamieson, were instituted, and continued for some years.

The published results excited much interest, for they demonstrated by actual field experiments that insoluble, or more properly termed undissolved, phosphates, if applied in a finely ground state and in sufficient quantity, were of very considerable value as a manure, whereas according to the previously held theory they were supposed to possess no practical value at all.

Further, these experiments proved that on certain soils ordinary soluble phosphate, that is to say, phosphate of lime rendered soluble by acid, was not superior in its action to undissolved phosphate to anything like the extent that had hitherto been generally supposed.

Not unnaturally, these results, being opposed to the theory hitherto held, excited a considerable amount of hostile criticism, which, however, time and more extended enquiry has proved to have been unreasonable.

The experiments were carried out at five stations situated in different parts of the country, and the soils are described as being black mould resting upon a granite subsoil, and the analyses show that in every case they were specially deficient in lime.

The figures for lime at these five stations being respectively 0·08. 0·17, 0·21, 0·33, and 0·38 per 100 parts of the dry soil.

Such soils were, in fact, exactly those upon which soluble phosphate, as supplied by superphosphate, would not be likely to exert its full benefit, while the vegetable acids present in the black mould would be certain to dissolve the finely-ground mineral phosphate to a very considerable extent.

In short, the conditions were most favourable to the action of dissolved phosphates.

About the year 1883 the now well-known Thomas phosphate powder, prepared from basic slag, was introduced to the agricultural world as an entirely new manure.

At first, agricultural chemists of high repute were disinclined to place any agricultural value upon this material, which was really only the refuse in the manufacture of iron from ores which, by reason of containing much phosphorous and silica, required additional lime to be specially added to remove the same,

Little by little, however, farmers were induced to take small quantities for trial, chiefly on their old grass lands, and the practical results were so good on certain soils, rich in vegetable remains but poor in lime, that scientific authorities were soon compelled to recognise the value of this manure when applied to suitable soils.

In this country the importance of fine grinding has been fully recognised as a test of the probable manurial value; but in Germany Prof. Paul Wagner of the agricultural station of Darmstadt has insisted upon the solubility in citric acid as a further test of probable manurial value, and it is to be hoped that the attention recently directed to this test by Mr. F. J. Lloyd will accentuate the importance of adopting some such additional test, rather than to confine the examination to a statement of the total phosphate of lime and the fineness of the grinding.

The author, however, had already adopted this citric acid method of testing the probable manurial value; but instead of employing the 2 per cent. cold solution of citric acid used by Wagner, or the 1 per cent. cold solution recommended by Dr. Bernard Dyer in his paper "On the Determination of probably available Mineral Plant Food in Soils" (Journal of the Chemical Society, 1894), he prefers to use a solution very much weaker, and in his opinion more nearly resembling the acidity of soil water.

The solution employed is 1 in 1,000, namely 1 grm. of citric acid to 1 litre of cold distilled water, taking 1 grm. of the slag or ground phosphate, and allowing the same to be exhausted with occasional stirring for 24 hours.

On referring to Table I. the relative solubility of five different kinds of ground phosphate is compared with that of basic slag.

The Peace River, with a fineness of 93·61, shows the highest figures for phosphoric acid dissolved out, namely 9·90 as against 8·70 in the basic slag; but as regards lime the latter shows 22·17 as against 15·23 in the former.

The French phosphate, specially rich in carbonate of lime. upon which the citric acid first acts, shows 15·34 of lime and only 2·85 phosphoric acid.

TABLE I.

Solubility in a Weak Solution of Citric Acid

1 grm. phosphate powder·

1 grm. citric acid

1,000 c.c. cold distilled water.

Allowed to stand 24 hours, with occasional stirring; then filtered, the insoluble portion weighed, and the solution analysed.

	1 French	2 Algerian	3 Florida	4 Tennessee	5 Peace River	6 Basic Slag
Containing phosphate of lime per cent.	50·36	55·99	78·26	79·57	61·23	28·97
Fine powder passed through 100-hole sieve. ..	76·21	67·69	72·37	91·63	93·61	83·8
* Portion soluble in citric acid solution	30·00	30 00	22·60	22·80	31·40	38·80
* Containing—						
Lime..................	15·34	13·66	11·87	11·64	15·23	22·17
Phosphoric acid.	2·85	6·35	8·25	8·40	9·90	8·70
Equall to phosphate of lime.	6·22	13·86	18·01	18·34	21·61	18·99

These results certainly go to prove that much of the good effects of basic slag must be ascribed to the ready supply of lime rather than to the supply of phosphoric acid. Further, that the solubility in citric acid solution depends upon the character of the phosphate, the fineness of the grinding, the strength and quantity of the solvent, and the time allowed for the treatment.

It has been stated that ordinary basic slag contains as much as 20 per cent. of free caustic lime, but this is not the case, and obviously so, because any such excess of lime would indicate a wasteful method

of manufacture, for lime is only added in sufficient quantity to remove the phosphorus and silica existing in the original iron ore,

Probably 2 or 3 per cent. of caustic lime is the utmost present, for most of the lime not combined with phosphoric acid exists as silicate of lime in a form readily soluble in weak solutions of vegetable acids, but not soluble in ordinary water, as may be easily demonstrated by actual trial.

The Preparation of Basic Superphosphate.—Bearing all the before-mentioned points in mind it occurred to the author that a manure, superior to ordinary basic slag in regard to its solubility, and at the same time combining its alkaline character, could be prepared by the addition of lime, preferably slaked lime, to ordinary superphosphate in sufficient quantity to convert such acid superphosphate into alkaline or basic superphosphate.

Experiments were accordingly made, and, it being found that the addition of lime in proper proportions did not render the soluble phosphates insoluble in very weak cold solutions of citric acid (1 in 1,000), such as might be expected to exist in certain soils, a provisional specification was at once filed and eventually a patent as granted.

The preparation in theory is very simple, but in practice there are certain mechanical difficulties to be overcome in order to effect a uniform and complete admixture of the acid superphosphate with the caustic lime.

The quantity of slaked lime required to be added depends upon its quality and the care with which it has been burned in the kiln. No particular degree of purity is necessary, but by preference the best commercially available is to be employed.

The orginal specimen of basic super was prepared from a super having the following composition:—

	Per Cent.
Soluble phosphate	27·72
Insoluble phosphate	4·82

This would be regarded as a somewhat wastefully made quality, having nearly 5 per cent. of undissolved phosphate; but it was found that a considerable portion of such phosphate, though insoluble in ordinary water, was readily soluble in weak solution of citric acid (1 in 1,000).

About 85 parts of the super were thoroughly mixed with 15 parts of good slaked lime and allowed to remain in a heap for fully 24 hours. Next day 1 grm. of the manure, with 1 litre of standard solution containing 1 grm. of citric acid, was placed in a large beaker, and, with occasional stirring, was allowed to stand for 24 hours, no artificial heat whatever being applied. On the following day the solution was filtered, the portion left insoluble was burned and weighed, and the filtrate carefully analysed for lime and phosphoric acid, with the following results:—

* Portion soluble in citric acid solution	94·70
† Portion insoluble (after burning) in citric solution	5·30
* Containing soluble lime ...	34·66
do phosphoric acid ...	12·00
Equal to phosphate of lime	26·19
† Containing insoluble lime ...	2·40
do phosphoric acid ...	0·65
Equal to phosphate of lime	1·41

According to calculation the sample so prepared should have contained—

Ordinary soluble phosphate ...	23·56
Ordinary insoluble phosphate ...	4·09

But the actual results obtained by treatment with the standard citric acid solution were—

Soluble phosphate ...	26·19
Insoluble phosphate ...	1·41

Consequently 2·68 per cent. of the phosphate originally insoluble in warm water was found to be readily soluble in the cold weak citric acid solution employed.

TABLE II.

Works Samples of Basic Superphosphate as actually prepared in England, Ireland, and Scotland.

	1	2	3	4
* Portion soluble in week citric acid solution.	94·60	94·20	93·00	92·60
Portion insoluble in same (after burning).	5·40	5·80	7·00	7·40
* Containing—				
Soluble lime.........	33·93	36·73	32·53	29·56
Soluble phosphoric acid...	13·60	13·35	12·00	12·45
Equal to phosphate of lime...	29·68	29·14	26·19	27·18

Manufacturers hitherto have never been paid anything on account of the so-called insoluble phosphate in superphosphate.

When made from materials like Tennessee rock phosphate, containing 4 to 4½ per cent. of oxide of iron and alumina, there must always be a considerable proportion of phosphoric acid retained in a form insoluble in water, but readily soluble in weak vegetable acids, and therefore probably available as plant food.

It is intended that the quality sent out shall average 25 to 27 per cent. of such so-called soluble phosphate, and that the manure shall always have a distinctly alkaline reaction.

Basic super is much more soluble in ordinary water than basic slag, as may be easily ascertained by treating 1 grm. of each with a litre of cold distilled water, allowing the same to remain in contact for 48 hours, with occasional stirring, and subsequently filtering off the insoluble portions and analysing the filtrate as follows:—

TABLE III.

Relative Solubility in Cold Water after 48 hours,

	Basic Super	Basic Slag
* Portion soluble..	66·80	6·60
Portion insoluble (after burning)	33·20	93·40
* Containing—		
Soluble lime.....	22·28	4.70

No phosphate soluble in water.

These results demonstrate the superior solubility of basic super and also may explain why basic slag fails on soils which do not contain an excessive proportion of accumulated vegtable matter.

It is not ordinary water, but water largely impregnated with vegetable acids, that is capable of dissolving a hard fused mass like slag. Ordinary water has but a slight action on slag, however finely ground it may be.

In this case the slag was very well ground, having a fineness of 83·88 and containing 38·97 per cent. of phosphate of lime.

TABLE IV.

Comparative Solubility in Ammoniacal Citrate of Ammonia

Taking 1 grm. of phosphate, 2½ grms. citrate of ammonia, and 100 c.c. water, gradually raised to boiling point and filtered, and the insolube portion burned and weighed.

	Basic Super	Basic Slag
* Portion soluble....................	86 70	28·90
Portion insoluble (after burning)	13·30	71·10
* Containing—		
Soluble lime................... ...	32·03	14·72
Soluble phosphosphoric acid...	10 20	3·35
Equal to phosphate of lime ·	22 27	7·31

The above results show that basic super is very readily dissolved by citrate of ammonia solution (slightly ammoniacal), while basic slag is only very slightly dissolved, though containing originally a higher percentage of phosphate of lime.

Mechanical Condition.—As may be expected, the condition of basic supper is excellent, being a dry powder easily distributed either by hand or machine; and the farmer need not fear that clogging in the drill, resulting from damp condition, which is such a difficult matter to overcome.

The light bulky character of the material as compared with the heavy nature of slag may be con-

veniently illustrated by placing the same weight in two ⅝ inch diameter glass tubes, about 1 foot long, when it will be seen that the basic super occupies a space of 11 inches, as compared with only 4½ inches occupied by the basic slag the relation being as 100to 40

This greater bulk in itself ensures a more perfect distribution, and will be appreciated by farmers who have already recognised the difficulty of obtaining a uniform delivery of slag, especially when applied by hand, for the heavy gritty powder falls between the fingers before complete delivery can be effected.

Its use as a Manure.—Basic super is not intended to supersede ordinary superphosphate on good arable land containing plenty of lime, but is intended to be applied on soils that are either deficient in lime or contain an excessive quantity of vegetable acids, such as sour pastures do.

It is also recomended as specially suitable as a fertiliser for turnips grown on land subject to the disease known as "finger and toe."

Manure manufacturers have suffered seriously from competition with basic slag, because on sour grass land acid manures were unsuccessful, but now, by the simple addition of slaked lime, ordinary superphosphate can be converted into a manure particularly adapted to all sour soils.

Field Experiments.—Of course, as the provisional specification was only filed on the 1st November last, no field experiments have yet been made, but during the coming season a fair trial will be made upon a great variety of soils throughout the United Kingdom, and upon the results so obtained the future success of manures will depend.

It may, however, be interesting, and tend to engender confidence in the new manure, if attention is directed to the reports of certain field experiments in which superphosphate and lime were applied separately with most satisfactory results.

In the joint report of Prof. Carruthers and Dr. John Voelcker on the improvement of grass land, published in the Journal of the Royal Agricultural Society for March 1898, the following statement occurs in reference to an experiment in Lincolnshire upon a soil containing only 0·17 per cent. of lime.

The soil is of a very light character, with a subsoil of clay; it is deficient in vegetable matter, and has not much potash, but is fairly supplied with phosphoric acid; and, from the analysis, lime would appear to be the great requisite.

Half the experimental plot was limed in January 1896 at the rate of four tons of lime per acre, and the other half received no lime.

On the limed portion mineral superphosphate was applied in February at the rate of 4 cwt. per acre; and on the unlimed portion, basic slag, at the rate of 8 cwt. per acre, was applied also in February.

The report states that "the entire half that had been limed has shown marked improvement."

"Basic slag used alone has produced more clover, but is hardly as good as mineral superphosphate with lime."

In the Journal of the Board of Agriculture, December 1900, Dr. Somerville, in a paper "On the Influence of Manures on the Production of Mutton," resulting from experiments carried out on Cockle Park Farm, in Northumberland, writes, respecting the grass plot that had received a dressing of 7 cwt. superphosphate in 1897 and 1900, and 10 cwt. of ground lime for 1897 and again for 1899:—

"This is a plot in which the interest increases each season, and this year it merits special notice, as it has produced the greatest aggregate increase of all.

The results are further favourably contrasted with those obtained from two other plots, one of which had received a dressing of 7 cwt. superphosphate, but no lime; and the other had received as much as 4 tons per acre of ordinary burned lime, but no superphosphate. He writes:—

"The main reason for this difference in the effect of lime is that where used alone its action is limited by the want of phosphates, in which the soil is very deficient; whereas in the presence of a phosphatic dressing it is able to exert its full, or nearly its full effect."

"On the other hand, phosphates, used alone, have not been able to exercise the maximum influence because of the *want of lime.*"

The practical results obtained by Dr. Somerville agree so well with the opinions expressed by the late Dr. Augustus Voelcker in 1863 that the author has a reasonable hope that basic superphosphate will prove a useful and economical manure on the particular kinds of soils already mentioned.

Instead of going to the expense of liming a field so thoroughly that every square inch of soil shall contain sufficient lime to neutralise the acid superphosphate that may be afterwards applied, it is proposed to add sufficient lime to the super before application, and thus secure a very important economical saving both of time and money,

If superphosphate can be thus adapted for application to sour soils, a great increase in the demand may in a few years be expected.

Moreover, the superphosphate employed may be made from materials containing more oxide of iron and alumina than usual.

Phosphates which have once been rendered soluble in water by treatment with sulphuric acid are superior, and must always remain superior, in their action to all raw phosphates, which are merely mechanically divided, however finely ground.

Though the total phosphates supplied by basic super may be less in actual amount than that existing in ordinary basic slag, they will be found much more certain and effectual in their results.

Mr. D. Wilson, D. Sc., of Carbeth, Killearn, very truly remarked, in a recent lecture on the manuring of farm crops: "Artificial manures should be so arranged as to yield a profit on the *first Corp*, and should be of a quick-acting class, and limited in quantity to the requirements of the particular crop."

Basic super may be regarded as a quick-acting manure, and may be used with advantage quite late in the season, with a reasonable expectation that under favourable climatic conditions satisfactory and economical results may be obtained.

(To be concluded.)

THE COCO-NUT.—INSECT ATTACKS AND THE VITALITY OF PLANTS &c.,

Coconuts are largely grown in Trinidad, but little attention, generally speaking, is paid to their requirements in the way of manure. At times they are stricken with disease, when the soil, the climate, an insect, or a fungus is sure to be blamed for the trouble; and in most cases special "remedies" are applied, which are expected to act "like a charm" in the removal of the mischief. Many instances could be cited where this has occurred, but it would be invidious to particularise. The scale insect is one which has generally been combatted with potions, poisons, or "remedies," and yet it still exists and is said to kill out the trees. Now there can be little doubt that ill health is one of the primary causes which lead to insect attack in the vegetable world; and, therefore, a due examination should be made of the soil and climate of the district in which the plants are growing for the purpose of ascertaining whether they are in reality getting all they require in the form of nutriment for the maintenance of healthy growth. From our personal observation it would appear that, if a soil is deficient in certain constituents, there is always a want of vigour in the plant cultivated and, in most cases, insect attack follows—and also follows where there is want of moisture, or too much of it, viz., drought and bad drainage. Instances have been seen where Coco-nut trees and other plants attacked by scale insects have completely recovered by being heavily manured, (*i.e.*,) supplied with those ingredients necessary for the plant to maintain itself in a healthy state. Although it may be quite clear that insect attack always follows bad health, it would be too

much to argue that plants are never otherwise attacked; for it may be freely admitted that there are insects of a depredatory or predatory character, which destroy plants in good health, without affecting the point, which is, that attacks are invited by a condition of bad health, arising through weakness of constitution, induced by unsuitable conditions of climate or season and frequently by starvation. In many plants constitutional weakness can be shown to exist, which is adequately proved by their passing out of existence in the struggle for life, and no amount of skill in cultivation or manuring could possibly give them the vigour or vitality of their surviving brethren. Such plants may at times have qualities which make them of value to the cultivator, and if they are grown for economic purposes, cultivation becomes one interminable fight against such weaknesses. Where special products are desired, it is always better to raise and select seedlings possessed of such vitality or vigour of constitution as will suit the climate or soil in which they are grown, and this may be generally effected by the common processes of artificial selection. In this way we find that in the United States and other places plants are being raised, the progenitors of which could not stand certain climates. The publication of the proceedings of the Hybrid Conference recently held by the Royal Horticultural Society in London makes it clear there is every reason to hope that strains or varieties of plants may be raised by taking certain precautions, which possess a vigour or suitability of constitution enabling them to stand the extremes of either hot or cold climates. Now, while we may not expect any immediate or present advantage to the Coco-nut from these methods, yet it is to be clearly pointed out that a method of selection may be followed, even with this plant, by taking seed nuts only from those trees which show they possess a vigorous constitution and mature nuts of saleable size in paying quantity. It is not to be expected, however, that individuals will do much with a plant which would take so long a time before results could be observed, and therefore in this, as in many other cases, the work is best performed by Experiment Stations that the objects in view may be carried on through a series of years. Many years ago I recommended the practice of selection for the Coconut but was met by the argument from a Trinidad grower that "the smaller nut had most meat" or as much "meat" as the larger one. Even if this is granted it is an indisputable fact that the larger nut sells better than the smaller one, always has done, and probably always will do. A Coco-nut tree planted in an unsuitable position will soon show signs that it is not getting all it requires and much may be done by the cultivator to ascertain and supply what is actually needed. In the Queensland Agricultural Journal for April, 1900, there is published a complete analysis by Dr. F. Bachofen of Mr. A Bain's* chemical Laboratory at the Ceylon Manure Works. Mr. Bain* writes:—

"Though there exist several analyses of parts of the Coco-nut, no one seems to have undertaken the task of getting a complete analysis made with the view of ascertaining the actual demand made by the Coco-nut upon the mineral constituents of the soil. Yet this knowledge is of paramount importance to those going in for manuring."

Dr. Bachofen's tables and analysis of quantities taken out of the ground by 1,000 nuts are here given as valuable addition to our knowledge.—*Trinidad Bulletin.*

COCOA IN TRINIDAD.

From sugar we pass to the newer industry of cocoa, although, so far as Trinidad is concerned, this is by no means a new industry. There are plantations in existence, the starting of which can be traced to over a hundred years ago. The development of this industry has certainly been remarkable. Forty years ago there were only some 7,000 acres of cocoa in cultivation. The total exports for the year 1899 amounted to the very large figure of 29,225,504 pounds—an increase in ten years of over fourteen million pounds. The cultivation is still being extended. The system of cultivation in Trinidad is a very interesting one. The present large estates have been made by the gathering together of the smaller areas under cultivation. These small areas have been started under what is known as the contract system. The contractors have generally been the descendants of the Spaniards and the French, and now to this class has got to added the coolie. The proprietor pays the cost of cutting down the forest, and when so cleaned the land is turned over to the contractor, who cultivates upon it plantains, tannias, (our cocoes, bananas and pigeon-peas, for a period of five or six or ten years. In return for this he undertakes to plant land with cocoa and shade trees, and when he gives the land up, the proprietor gives him a shilling for every tree planted. The laws in protection both of the contractor and of the proprietor who gives the contract are well drawn, enabling the contractor to get justice and at the same time safeguarding the rights of the proprietor under the contract. There is not much to be seen of coco acultivation from the roadside, but undoubtedly it is an ideal cultivation for a European in the tropics. In Trinidad the soil is of such a nature that it easily cakes and dries under the sun; and consequently it is necessary—in Jamaica, I understand, it is not so necessary—to plant permanent shade trees. In starting the plantation, after the trees have been raised in the nursery they are planted out, each tree being surrounded by four banana suckers. The banana which is principally used for this purpose in Trinidad is the so-called fig-banana plant producing a much smaller variety of fruit than ours. These young bananas form the shade for the young cocoa, but at the same time there has to be planted the permanent shade tree, and by the consensus of all opinion the tree that is best adapted for this purpose of permanent shade is the Immortelle, known by the Spaniards as the *Madre de Cocoa*, or the "Mothe of Cocoa." This tree grows very rapidly, much more rapidly than the cocoa itself, and grows to a great height. By the time it is necessary for the cocoa to have shade the Immortelle is there. The protecting influence of this shade has given it the name it so well deserves of the "Mother of Cocoa." the Immortelle is a tree that does not throw deep roots into the ground, and apparently takes nothing from the soil which the cocoa needs. The falling of its flowers and leaves seems to supply a valuable manure to the soil. It is almost impossible to conceive a more beautiful sight than the hillside one mass of beautiful red when the Immortelle is in bloom for it bears a red flower. Walking through the cocoa plantations when the blossoms are falling, one treads on a carpet of fallen blooms. There are other shade trees that are spoken of, notably the hog-plum, the sand-box, and that variety of the rubber plant known as the *Castilloa*. The Immortelle, unfortunately, is easily blown down, and with the immense length does considerable damage to the cocoa trees when falling. As a rule, however, when it falls it is very largely rotten, and the decayed vegetable matter forms an important manure. The best authorities agree that the cocoa fields should be kept as free as possible from all grass, although of course, as in everything else, there are people who dispute this. The trees have to be pruned regularly and carefully, and it is interesting to state here that a very large percentage of the cocoa planters firmly believe that only at cerain phases of the moon should this be done, the running of the sap in the trees being affected by the action

* *Sic.* Mr. A. Baur, of course.—ED. *T.A.*

of the moon. This has been disputed by scientific authorities, such as Mr. Hart, of the Botanic Gardens; but still the belief exists among the planters who personally told me that, though they can find no scientific reason for it, nevertheless they are right. It is necessary on cocoa estates to have good drainage, and the drains must be kept clear so that the land shall not get soured by the accumulation of water. A large quantity of moss is all the time gathering on the trees, and this moss has to be taken off by the process known as "brushing," brushes made of stiff fibre being used for the purpose. The moss, of course, accumulates on the trees with varying rapidity, according to the moisture of the climate, but it is generally conceded that in most districts the trees require brushing once in three years.

How Prepared for Market.—It may, no doubt, be of interest to some of my readers to know just how the cocoa is picked and prepared for market in Trinidad, and the following account, I think, about covers it. Picking is started, say, on Monday, and the pods when picked are gathered in piles which are left there until Friday morning or afternoon, according to the quantity picked. The breaking or opening of the pods commences either on Friday or Saturday morning. The pods are opened at the pile and the beans taken out and "crooked" to the sweat-box that is to say carried in baskets on mule-back to the sweat-box. The reasons for not breaking and taking the beans in every night are many :—(1) Because it would be expensive. (2.) Because the fruit is too fresh from the tree. (3.) Because the sweating would not be regular and it would not be possible to get a regular kind of cocoa both as to size and colour. (4.) Because too many sweat-boxes would be required.

By allowing cocoa to remain in the pod for four or five days in the field before breaking, it is found that fermentation gradually begins, and the fruit benefits from all the aroma there may be in the pod. Once in the sweat-box, the beans are covered with plantain leaves, and in a couple of days fermentation is very strong. The sweat-boxes, on properly arranged estates, are fixed in a series so that, when fermentation commences, the beans are changed from one box to another, and this process is allowed to go on for four, five, or six days, according to the quantity of the cocoa it is desired to produce. Highly fermented cocoa formerly fetched very high prices, but to-day the difference in price is so little that the planters are seriously considering the question as to whether it is wise to waste the time and extra loss of weight that is required for extreme fermentation—though it is only right for me to state here that there is a great divergence of opinion as to whether after a certain period there is any extra loss of weight by fermentation. From the sweat-box the cocoa is put in the sun and spread out very thin, and while it is in that state, labourers, principally coolies, are employed to walk on the cocoa, or, as it is called, to "mash" it. Whilst the labourers are walking over the beans they are also busy picking off any pieces of fibre which may adhere to them from the pods. During the first day the beans are carefully watched and turned about so as to let the sun get at all of them. If the sun is too hot, the cocoa-house is closed and the cocoa heaped up. In the afternoon, it is opened out until sunset. After this process is over, the cocoa is "danced" for two or three days. That is to say, coolies are employed to perform a dance on top of the cocoa. This must be done when the beans are still soft, as when half-dry it is too late and the cocoa is apt to get spoiled. The cocoa is cured in eight days, provided there is sufficient sun. The cocoa drying-house is an interesting building and requires some explanation to the uninitiated. Posts are firmly driven into the ground at distances, say, of about four or six feet apart. On these are laid beams, and on the beams is put an iron rail. The roof is a pitched roof covered with corrugated iron, and is made in two sections, the sheets of one slightly overlapping the sheets of the other. Underneath the beams, forming the sides of the roof, are wheels, which run on to rails. If the cocoa house is 60 feet long, then 15 feet on either side are left unfloored, whilst 30 feet in the middle are floored. The roof covers this centre part, but when the cocoa is to be exposed to the sun the two parts of the roof are pushed apart, leaving the boards bare to the sun. A couple of men can open or close the house, and they watch for every sign of rain in order to do this. On many well-regulated estates, underneath the cocoa house are situated all the rooms necessary for the cocoa—the sweat-boxes, the packing-room, etc. A good many of the estates, especially those in districts where there is a good deal of rain, are adopting artificial curing by means of hot air, but practically all are agreed that there is nothing like Nature for doing the work thoroughly and properly. In case of some of the finer grades of cocoa, during the dancing process a particular kind of red clay is sprinkled on the beans, which gives them a bright, shining, brown appearance. No cocoa is prepared by our method of washing, although this is sometimes done when the beans happen to get "weathered." A good many of the estates are situated in the highlands, and at present there are very few good roads, so that all the cocoa has to come down on mule-back either to the railway station or to the commencement of the cart road.

As regards the future of cocoa in the markets of the world, it is difficult to say. For many years the consumption of cocoa was comparatively a small one, and the article fetched a very high price. The fall which took place fifteen years ago called the attention of many people to the enormous profits being made by cocoa manufacturers. There was a sudden development of the industry and the consumption has been greatly increased. Unlike coffee and tea, cocoa has still large areas of cultivation to conquer, and, uniting in itself, as it does, the properties of a valuable beverage and a wonderfully sustaining food, it does look as though the future of cocoa is a good one. It must not be forgotten that large areas have been placed under cultivation recently, and enormous quantities are being grown in many parts of the world. The island of San Thome, off the African coast, which was practically unknown a few years ago, is now supplying vast quantities of cocoa. The only thing that can be said is that, at the present price, cocoa is an enormously remunerative industry, and that it can bear a considerable fall in price without its arriving at a point where it could not be cultivated. In Trinidad it is estimated that the cost of production of a fair bag of cocoa is $8, the bag weighing 168 lb. The value of that bag of cocoa to-day is bout $21.

Nearly every day one is hearing of some new use to which cocoa is being put. This is largely owing to the advertising genius of the manufacturers. One can hardly open any magazine or newspaper without coming across some advertisement of cocoa or chocolate. It has been discovered that the article is of great nutritive value, and therefore it is constantly being put to some new use. It has been largely used by the British troops in South Africa, and has been found wonderfully sustaining under hard conditions of campaigning, with the additional advantage that a large quantity of nutriment can be compressed into a very small space. But of course I would say to Trinidad what I would say to Jamaica—that it is a bad thing to rely upon one article of export.

The life of a cocoa planter in Trinidad is certainly most pleasant, and work among the beautiful shaded cocoa trees is possible to a European without unduly suffering from the rays of the tropical sun. A walk through the cocoa plantations when the trees are bearing is a most beautiful sight. The same tree has on it flowers, buds, and pods, in every stage of

development, and one can practically from day to day watch the maturing of the crop.—*The Journal of the Jamaica Agricultural Society.*

SIMPLE METHOD OF STRIKING CUTTINGS.

The accompanying illustration of a simple method of striking cuttings, which we take from *Farm and Home*, will commend itself to all horticulturists. We have tried a plan somewhat similar and find it of great advantage. The Journal in question, replying to a correspondent, says of the method:—It has been recomended to us by an experienced gardener. It is made and used thus: Take two flower pots, one large and one a few sizes smaller. Place in the larger one a layer of pebbles, broken bricks, &c., a few inches of black earth. With a good cork plug the drain hole of the smaller pot and put it inside the larger one, centring it upon the layer of mould. Fill it with water, and fill the circular space between the pots with more mould. Insert the cuttings all round, and without further attention they will strike roots and thrive in a way calculated to make the floriculturist's heart glad within him. The roots and fibres make straight for the sides of the water reservoir, through which all the moisture they require is absorbed. If the packing of the earth in the larger pot has been properly done, the smaller pot can be lifted out now and then, and the process of root formation readily observed. Seeds can also be germinated readily in a simple contrivance of this kind. Choose fine sandy loam for striking the cuttings. If the weather outdoors is very cold, stand the pot in the kitchen, particularly at nights.—*Queensland Agricultural Journal.*

THE PINEAPPLE INDUSTRY.

Pineapples attain to greatest size in the West Indies, some weighing 12 to 13 pounds. Great care is taken in packing them to secure their arriving in England is sound condition. The stalk is cut several inches below the fruit; an ordinary large-sized flower pot is then filled with mould, into which the stalk is inserted in such a manner that a casual observer would almost take it to be the way it was grown. Each pine is then put into a skeleton wooden case made just enough to hold it, so that it can be safely handled without the risk of being bruised or injured.

Pineapple culture is yet in its infancy in Florida, but the success that it has already met with in some parts of the State promises to establish it as one of its most profitable industries. The following varieties have given the best satisfaction: Spanish, Sugar Loaf, Cayenne noted for its large fruit and the absence of stickers on its leaves, and the Egyptian Queen or Trinidad. This latter is probably the first variety grown in Florida: the fruit is of large size, superior quality, and with an almost entire absence of the toughness noticeable in some varieties. Cotton seed meal is found to be the best fertiliser, and generally fifteen thousand plants are put to the acre, yielding an average of ten thousand fruits. Three or four annual crops are produced without replanting. Last year a crop of Egyptian Queen yielded to the planter a net income of seven hundred dollars per acre. The lowest returns the same individal ever received were three hundred dollars. The net price received is from three cents to twelve cents each, depending upon size, quality, season, and condition of the market. But the pineapple area is limited. The bulletin of the agricultural division of the Census Bureau states that there are now 23,496,000 bearing plants in Florida, which is the only State in the Union where it is cultivated.

MEXICO.—In the tropical districts of this country the culture of the pineapple is being rapidly promoted owing to the increased demand from the United States. Experiments made last year demonstrated that it was better to have the plants wider apart (say 8000 to 10,000 per acre) as they then produced larger pines. The close planting hitherto practised is the cause of the larger puantity of small fruit that floods the markets. Between the rows of pines they planted corn, the product of which more than compensated for the necessary labour in caring for the pines. The pineapple not needing a very rich soil and only moderate food was benefitted rather than retarded by the corn: it was discovered that too much fertilizing actually retarded the growth of the pines, for being allied to air plants a large share of its nutriment is drawn from the aii, leaving the roots, but little to do.

OTHER COUNTRIES.—In Ceylon, there are about 9,000 acres covered with pineapples, in Cochin China about 8,000 acres and in India enormous quantities are grown in great ranges in Assam, in Rangoon, in the Tenasserim provinces and at the foot of the Himalayas. But it is mostly consumed locally and does not figure in foreign exports. From Acapulco there are annually shipped to San Francisco about 800 000 pineapples realising about $6 per 100. Cultivation is increasing, owing to the large demand from the Pacific Coast.

Honduras annually exports to the United States about 150,000 of three kinds—the horse, cherku and sugar-loaf.

Antigua exports to England about 5,000 barrels annually of the black-pine pineapple.

Havana exports principally to the United States the surplus over local consumption, about 60,000 barrels each containing 35 pines of first, 45 of second, or 50 of third cuttings. The average price per barrel ready for shipment is $6 $5, and $4, for each quality respectively, and the freight to New York is 30c. to 50c. per barrel. There is a continued increase of production.

The annual import into the United States from the West Indies is over 5,000,000 pineapples.

PRESERVES.—In Florida an excellent wine and cider are made of the pineapple; and in the Azores wine and alcohol are largely made.

In Nassau the local demand of fruit for tinning equals the amount of fresh fruit exported. The operation of peeling and slicing is performed on tables in the yards near the waterside. The cans are carried to the warehouse on wooden trays (each containing fifteen), to be immersed in syrup. The tops of the cans are soldered on, and they are lowered in an iron framework, 400 and 500 at a time, into the steam boiling vats. After boiling, the cans are preforated at the top to allow the stream to escape. They are then hermetically sealed and spread over the yard to cool. Each can of fruit, before the syrup is added, weighs two pounds.

All the apparatus and the tins used in the canning factories are imported from new York.

Almost every modern cook book furnishes receipts for making jellies, marmalade and preserves from the pineapple. The following, which

has been tested by the writer, is a receipt largely used in Florida for making pineapple marmalade for family use or in large quantities for trade. "Select large sugar-loaf pineapples, peel them, take out the eyes, which are not very deep in the sugar-loaf, and grate them on a porcelain grater into an earthen dish. Do not grate the core. Weigh the juice and pulp and measure out to every pound three-quarters of a pound of sugar. Mix the sugar with the pulp and boil it for an hour to an hour and three-quarters, until it is a smooth, clean paste and firm."

Chichi or pineapple wine is a delightful and favourite drink made of the pineapple in Mexico and other tropical countries. A small quantity is made as follows: Over the peelings of two pineapples pour one quart of boiling water: allow it to steep until cold, then sweeten to taste, strain and bottle. Tie down the cork and place the bottle on its side; if placed in a warm place it will be ripe in 24 hours. A small piece of ginger placed in each bottle will improve the flavour. If made in large quantities the whole pineaple chopped should be used.

PINEAPPLE FIBRE.—The plant affords fine fibre of practical utility from the leaves, which are about 3 feet long by 1½ to 2 inches wide, strongly edged with spines except in the one variety known as the smoothleaved Cayenne. Besides the fineness of the fibre for textile fabrics, it is remarkably strong when made into cordage. A government test made in India proved that a rope 3¼ inches in circumference would bear a weight of 42 cwt., it actually breaking with 57 cwt. We quote from published reports concerning this fibre. This fibre however is produced chiefly from a species of wild pineapple, though the fibre of the cultivated plant is of excellent utility.

"The pineapple grows in great abundance in the Philippine Islands, but produces only a small dry fruit. We require, however, more precise information to enable us to determine whether this is actually the plant escaped from cultivation. Mr. Penelet, of Pondicherry, considers it a distinct species, and has named it Bormelia pigna.

"In preparing the fibre for weaving, the fruit is not allowed to ripen early; its removal causes the leaves to increase considerably both in length and in breadth. A woman places a board on the ground, and upon it a leaf with the hollow side upwards. Sitting at one end of the board, she holds the leaf firmly with her toes, and scrapes its outer surface with a potsherd, not with the sharp fractured edge, but with the blunt side of the rim; and thus the leaf is reduced to rags. In this manner a stratum of coarse longitudinal fibre is disclosed, and the operator, placing her thumbnail beneath it, lifts it up and draws it away in a compact strip, after which she scrapes again until a second fine layer of fibre is laid bare. Then turning the leaf round, she scrapes its back, down to the layer of fibre, which she seizes with her hand and draws at once, to its full length, away from the back of the leaf. When the fibre has been washed, it is dried in the sun. It is afterward combed with a suitable comb, sorted into four classes, tied together, and treated like the fibre of the lupi. In this crude manner are obtained the threads for the celebrated web "nipis de pina," which is considered by experts the finest in the world.

"In the Philippines, where the fineness of the work is best understood and appreciated, richly embroidered costumes of this description have fetched about £200 each.

"This fine muslin-like fabric is also embroidered by the nuns of the convents in Manila with great skill and taste.

"The manufacture of the pina fabric is carried on in the metropolitan province of Fondo. From the extraordinary facility with which the pineapple is grown in the vicinity of the equator, it seems almost certain that, by the application of modern skill to the process of separating the fibre from the pulpy matter of the leaf, a valuable raw material composed of it might be obtained for the nations of Europe. The fibre by the hackling process could be rendered fit for the finest fabrics. The leaf consists of two different structures, the upper side being of a soft or pulpy character, easy of removal; and the under side, of a harder or more ligneous nature, and more difficult to separate. These two external bodies hold the fibre betwen them.

"In the Straits Settlements the Chinese laborers have taken kindly to this new and promising branch of industry. The process they adopt in preparing the fibre appears to be much the same as that pursued in the Philippines. After being scraped with a bamboo plane they are steeped in water and washed and then laid out to bleach on rude frames of split bamboo. The process of steeping, washing, exposing to the sun is repeated for some days, until the fibres are considered properly bleached. Without further preparation they are sent into town for exportation to China."

Nearly all the islands near Singapore are more or less planted with pineapples, covering an extent of about 2,000 acres. But the manufacture of the fibre or trade in fruit does not amount to much.

"The wild brother of the pineapple has a larger leaf and longer fibre. It is common in the Antilles, growing in the most arid spots. It makes excellent mats, hammocks, and ropes. Almost all the fishing tackle of the American mercantile marine is made of it.

"The leaves are 5 to 8 feet long, and from 1½ to 3 inches wide, thin and lined with a tough fibre. The plant is self propagating, and left to itself in an open field will soon cover the ground. In Central America, but particularly in Nicaragua, it is so abundant in the forests as to be a serious obstruction to man or beast. It is largely cultivated in the districts of Mexico. It is indifferent to soil, climate and season, while the simplicity of its culture, and the facility of extracting and preparing its products render it of universal use. From it is fabricated thread and cordage, mats, bagging, clothing and hammocks."—*Hawaiian Planter's Monthly.*

BANANA MEAL.—We call attention to the letter of Messrs. Haddon & Company, of London, in Correspondence Column, and their offer to take Banana Meal at from 30s. to 35s. per cwt. It will just pay at the price, when the maker is in a good banana district, and yet is far from shipping places, and so can get plenty of bananas at his own door cheap; when also he goes into the business properly with artificial driers and other facilities for saving time and labour. At 30s. the price per lb. runs to about 3¼d., at 35s. the price is 3¾d., and at the latter figure there is a good working margin.—*Journal of the Jamaica Agricultural Society.*

IMPERIAL GARDENS FOR FRUIT-TREE DISSEMINATION THROUGHOUT THE EMPIRE.

By Dr. Bonavia, F. R. H. S.

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It is gratifying to learn that the two noble Bananas of India—or Plantains, as the English there call them—have been at last introduced into the Royal Gardens at Kew.

The *Ram Kelà* and the *Champa* Bananas must have been known to the British in India for perhaps a hundred years, and yet nobody, until recently, has ever thought of introducing these fine things either into England or to any of our colonies.

I do not think there are many plants the stools of which—like bulbs—can be taken long distances without any special care. The Banana is such a plant.

The way it is grown in Northern India is this :—

A trench is dug, three feet deep and as many broad. The bottom of the trench is manured, and the bulbous roots, with their sprouts, planted there, four or five feet from each other. Then every year a lot of fresh cow-dung is thrown round the stems, until the trench is filled up in the course of years, when the site is changed and the same process repeated. The Banana requires plenty of water, except in rainy seasons.

In Northern India the choicest varieties cannot be cultivated, as both the hot winds and the cold winter nights are unfavourable to them. Bombay, Madras, and Bengal are the districts that suit them.

The comparatively inferior variety now so largely grown in the West Indies cannot be compared with the choicer ones of India.

It is surprising that wealthy persons in the United Kingdom have never devoted a special glass-house to the cultivation of these indubitably fine varieties of Plantain.

The introduction of these choice Bananas into England is a movement in the right direction. Eventually they can be disseminated throughout the tropical dependencies of Great Britain.

But this is not enough.

There is room for two or three Imperial Gardens, where some of the choicest fruit-trees of the world could be collected, studied, and not only disseminated throughout the Empire, but new ones evolved by seed variation and cross-fertilisation; for it is idle to suppose that all these choice fruits were originally contained in the "Garden of Eden."

Let us take them :—

(*a*) One or Two Gardens for the Citrus Genus.

There are so many fine and distinct varieties of this wonderful genus—some of which are very little known out of the localities in which they are grown—that it would be an advantage to the people of the Empire, and also to mankind in general, to have them collected for the study of their botanical and horticultural characteristics and commercial values.

The Portugal Orange Group.

The Portugal Orange, of which the British markets are now full, with its variations, the seedless oval Orange of Malta, and the oval Orange of Jaffa, also seedless, and the Blood Orange, &c., are sufficiently well-known to need no description.

I am informed that in Malta there exists a unique Orange of the same group, but which is never sour from beginning to end, but sweet and juicy. It is called there "Loòmmi-Laiènj." I have never met with an Orange of this description in India. It would be worth while getting hold of it for the purpose of multiplying it and bringing it into commerce. Such a unique Orange, I believe, has never appeared in the English market.

In India I met with two varieties of this group; both are fine and worthy of being more generally known. The one is the "Bàndir" of Tanjore, a large Orange, 12 in. in girth or so, with a yellowish-orange skin when ripe. The other is the "Mussèmbi" of Poona. Its name is evidently a corruption of Mozambique, and it goes to the Bombay market. The exterior is orange-yellow, and is covered with longitudinal furrows from base to tip. Natives say this can be kept on the tree for a whole year without deteriorating.

The Suntara Group of India.

The loose-skinned "Sùntàrà" Orange of India, as far as I know, has only appeared once in the London shops. There is a considerable trade in this Orange in India itself.

There are two widely spread varieties of it. The one is called "Nagpore" Orange, some of which find their way to Bombay. It is this, I believe, which, on one occasion, was sent to London.

The other is the "Sylhet" Orange, which mainly goes to Calcutta, and is grown *solely* from seed.

The fruit of the two differs little, but the tree of the former has a spreading form; while that of the latter is upright, somewhat in the fashion of a Lombardy Poplar, although, of course, not so tall by any means.

There are other good varieties of this group which are little known. One is grown in Lahore, the fruit of which is distinctly pyriform (see *Oranges and Lemons of India and Ceylon*, Plate cix.) It is wrongly called 'Kàrna' in Lahore. Another is the 'Jàwa-narun' of Ceylon, resembling a purse with a much, puckered surface.

A still more interesting variety is the green Orange of Ceylon, called there 'Kònda-nàrun.' It is invariably eaten in its green state. Rumphius mentions an Orange which is green when quite mature, and if left on the tree till it colours becomes, he says, worthless. But in an experiment which I made with these green Oranges in 1884, I found them better flavoured and more juicy as they turned yellow.

Both the 'Jàwa-nàrun' and the green 'Kòndanàrun' are pictured in Miss North's Gallery at Kew, No. 266.

In Ceylon, a number of the varieties of the 'Sùntàrà' group are called Mandarins, but the only true Mandarins I ever saw there were a few on a neglected tree which the late Dr. Trimen showed me in Peradeniya.

The Tangerines of the London shops are no other than Mandarins. * I never could discover one in London worth eating. To enjoy it you must grow it yourself, and take it off the tree when fully ripe. The perfume of its peel is not to be found in any other Orange

To the 'Sùntàra' group belongs a small Orange grown almost wild on the borders of Nepaul, north of Goruckpore. It is the sweetest Orange I ever came across, perhaps a little too sweet. It is locally known by the name of *Sùntolah.*

Another important Indian Orange belongs to what I consider a subgroup of the 'Suntara.' It goes by the name *Kèonla* or *Kàmala.* Its exterior is of a deep lobster-red, and even when quite coloured is sourish, but if left for a long time on the tree it sweetens. It is the latest of all Indian Oranges.

The *Làroo* of Poona is, I consider, a variety of the foregoing. It is flat and very loose skinned, so much so that the pulp-ball can be made to rattle within the skin.

I have enumerated all the Indian Oranges that could, I think, be made marketable, although there are several others.

It is not easy to find a place for an Imperial Orange Garden, where all the Orange varieties of the Citrus genus could be studied, for one kind of soil might not suit them all. The Mediterranean climate would probably suit all varieties, and Cyprus or Egypt might perhaps be mentioned as an eligible locality. It must be a place where water could be easily procured, and not subject to frost.

(*b*) A Mango Garden.

An Imperial Garden for Mango trees of the choicest varieties, for the study, propagation, and dissemina-

* Perhaps they may be a seed variety, and a little smaller than the true Mandarin,

tion of this noble fruit. There are at least about fifty choice varieties of this unique fruit, some of which cannot be bought, but are grown in the orchards of native gentlemen, and kept for presentation to important officials and select friends.

The Mango is the one fruit in which the native of India takes a real interest. You may mention to him many other fruits, but he will tell you "They don't come up to the Mango."

No one who has not lived some time in India, and has discovered what a choice Mango, just ripe, means, can form any adequate idea of the exquisite flavour of this fruit.

New arrivals in India, having heard of the Mango, very often get hold of seedling bazaar Mangoes, and pronounce them a fine combination of tow and turpentine. They have a sort of turpentine flavour, and the inferior varieties are very stringy, and can only be sucked. Nevertheless, there are often exquisite flavours even among these.

The Mango is never allowed to ripen on the tree, but is plucked at a certain stage and packed in large jars among straw. This operation is called putting the fruit in *pāl*. The reason given for this is that the Mango ripens more evenly and thorough than on the tree. In England Pears are treated in much the same way. When taken off the tree they are not fit to eat, and many kinds of Pears require to be kept a long time before they are fit to eat.

This characteristic of the Mango fruit would prove advantageous for exportation, as it would ripen on the voyage.

All the choice varieties most probably originated by seed-variation, and their good qualities are kept up by proper cultivation.

All the fine varieties are propagated by grafting them on seedlings of the ordinary ones.

The Mango tree cannot be grown successfully in localities subject to severe frost. On one occasion, in Lucknow, in the first week of January, five degrees of frost were registered. All the Poinsettias in the Horticultural Garden were, of course, killed outright; the young seedling Mango plants in the nursery prepared for grafting were killed; and up to six feet from the ground all the leaves of the large Mango trees were blackened, but above that line no leaves were touched.

In the hot dry weather the trees want regular watering.

Some place in India not subject to frost, and where water can be easily got at, and with good soil, would be suitable for a garden such as is here suggested.

There are so many exquisite varieties of Mango that they could not readily be studied, and their characteristics found out, without being collected in one garden. From thence they could be disseminated to all parts of the Empire where the climate would be likely to suit them.

I have often tried those that sometimes appear in the London shops from the West Indies and other Atlantic islands. I never found one worth eating. They would not be looked at by an Indian Mango connoisseur.

I have often wondered why wealthy English gentleman, with extensive gardens and acres of glass-houses, have never, that I am aware of, undertaken to build a special house for the reception and growth of the trees that produce one of the finest fruits in the world.

It is the same with oranges. The British markets are flooded with foreign Oranges, which are often unripe and sour. When ripe they are mostly stale, and not infrequently have a flavor of onions or tar. The flavour of tar is acquired from the ship-hold, and that of onions comes from a mixed cargo of oranges and onions!

To eat an Orange off the tree when prefectly ripe would be a revelation to persons who have not been in Orange countries, and the difference between those imported and those taken off the tree at the right time is something like the difference between night and day.

And yet one never hears of any wealthy gentleman undertaking to erect a special house for Oranges, and to collect these fine things which are to be found in various parts of the world.

There is such a thing as a movable glass-house on rails. Such contrivances would be very useful in England, where foreign fruit trees might be kept warm under glass in winter, and the house wheeled off them in summer to expose them to direct sunlight and rain, both being very invigorating to all trees.

If the present movable house is somewhat cumbersome it could be made in sections; and surely the engineers who have built the bridge over the Forth, and have done other wonderful things, would be equal to inventing a house that could be easily drawn away by either horse, steam, or hydraulic power.

Then I am told that the reason why Orange trees are not popular in England is that their leaves have to be washed, which is a great bother. I am afraid, however, that sufficient experiments have not been tried, with washes syringed over the leaves, to rid them of that curious sooty, powdery parasite that more or less covers them. There is the ammoniated sulphate of copper, used successfully by the French to combat mildew on vines; there is a carbolic soap, and petroleum, and other combinations that might be tried.

I must not forget, however, that I am writing about Imperial Gardens for the dissemination of fruit trees which are little known, and not about private gardens.

Where Mango trees in India can be grown, Guavas, Lichis, and Bananas can be also grown.

Of Guavas there are two forms, the globular and the pyriform. Those sold in bazaars are not choice, but they make one of the finest fruit jellies in existence. You have to eat Guava jelly, freshly made, with clotted cream, on toast, to understand what this fine thing means.

All Guavas make a capital stew—peeled, with the seeds scooped out, and stewed in sugar and a little water. They are excellent, with a *sui generis* flavour.

The raw fruits are not much relished by the English in India, owing to their strong scent; some cannot tolerate them in a room. But there are Guavas and Guavas. The choice varieties would be worthy of cultivation in an Imperial Garden. There is one fine variety which I came across in Lucknow. It was presented to me by a native gentleman, and strange to say, it had the flavour of Strawberries! It is curious that this flavour should be imitated by two such distinct fruits as the Grape and the Guava.

Of the Persimmon I know nothing, except what I read of it. Of the Mangosteen I know nothing from personal experience. Everyone who has eaten it declares it to be a delicious fruit. I was informed that it had been introduced into the lower ranges of the Nilgiri Hills. Why they have not introduced it into Ceylon and cultivated it for commercial purposes is a mystery.

I think I have enumerated all the choice fruit trees of which I have experience, and which might be grown in Imperial Gardens for dissemination throughout suitable places in the Empire. In such gardens these trees could be studied, and the best mode of cultivating them and propagating them discovered. Moreover, it is only in such institutions that new varieties could be evolved from seed, for no private garden could possibly undertake the creation of new varieties of the fruits herein mentioned on the scale that would be required for success.

It might be said, especially with regard to Oranges—why undertake such a troublesome and expensive job, when shiploads of Oranges are already imported from various places? Well, no one will say that Apples are not grown in this country in large quantities—the bewildering number of varieties at the shows testifies to this—yet shiploads of Apples come from Canada and the United States.

What is being done in America with regard to fruit trees should be a lesson to the rulers of the British Empire.

I have left ont of consideration a large number of varieties of the Citrus tribe which are to be fonnd in India, such as Lemons, Limes, and Citrons &c. The latter might be ntilised in India and elsewhere for making candied citron-peel. On one occasion I gave some Citrons to a lady friend, and explained to her how this preserve was made. She turned ont a candied peel which was much finer than any I could obtain in the shops, and the late Mr. Philip Crowley of Waddon always had most excellent home-made citron-peel.

The number of varieties of Citron to be found in India is astonishing, as a glance at the 'Oranges and Lemons of India and Ceylon' will show.

There is one fruit which must not be omitted in this sketch. It is the red-fleshed Pummelo of Bombay. When cut across, its pulp is of the colour of raw beef, and it is the thinnest-skinned Pummelo that I ever came across. It is fine-flavoured and juicy, and when the large juice vesicles are taken ont and mixed with sugar they are delicious. This Pummelo is of the size of a child's head, and sometimes of the size of a child's head affected with hydrocephalus?

I have done with these fine fruits, bnt there is one plant which should be grown largely in India itself —I mean the Date Palm. In Imperial Gardens experiments might be systematically undertaken with the innumerable varieties of the Date Palm which are known in Asia and Africa; about 150 at least, although not all of first-class quality. The success obtained with these trees by the Superintendent of the Saharunpore Garden proves undoubtedly that the notion that the Date tree cannot be grown successfully in India for its fruit is an antiquated superstition. India is written with five letters, but it is as large as Europe without Russia? The Date tree experiments, if undertaken, should be under the care of a practical Date-grower imported from the Persian Gulf.

It is not intended in this sketch that Imperial Gardens should have anything to do with growing flower-plants and vegetables. That is already done in provincial horticultural gardens. The object should be to collect in one place, and under one supervision, as many of the choice fruit trees that can be grown in that locality, for the purpose of studying them, describing them, classifying them, and discovering the best mode of cultivating them, with the object of disseminating them throughout the Empire in suitable localities, for the health and enjoyment of the people, and for commercial purposes. —*Reprinted from the Journal of the Royal Horticultural Society.*

IRRIGATED COFFEE.

The subject of improved coffee culture having been freely discussed in our columns, we requested Mr. Meenashaya, a retired Judge of the Mysore Chief Court, and now engaged in the interesting occupation of growing coffee under a system of irrigation at Gouripuram, near Tumkur, Mysore, to favonr us with a description of his estate, methods of culture and other particulars. He has very kindly complied with our request, and we feel sure that all coffee planters will be interested in what he has to say. His estate is a small one of 40 acres and when the trees are mature he estimates that he will obtain 12 tons of coffee a year. The value of the crop he places at the modest figure of Rs. 10,000, or say Rs. 40 (53s) per cwt., while the cost of production, including everything, is estimated at only Rs. 3,600 or Rs. 2,700 under tank irrigation. Thus the net profit on the 40 acres is Rs. 6,400 or Rs. 7,300 per annum. Multiplied by 5, to make 200 acres, which ought not to be difficult to obtain under tanks, and the profit is Rs. 36,500. This does not, of course, include capital account and the necessary adjustments, but is the net profit of a matured estate. There are many other details which prospective irrigation coffee planters would have to look into for themselves; but even if we halve the prospective net gain the return is still at the rate of say Rs. 1,500 a month, a profit that is not to be despised. Of course, it remains to be seen what the life of coffee trees will be under the irrigation system, but it does not seem unreasonable to calculate upon at least as long a life as trees which have to depend solely upon the lifegiving rains for their vitality. How irrigated coffee would fare in a famine year is another question that remains to be solved; but even in famine years all the rivers do not run dry, and the Cauvery certainly is a perennial stream whose waters might be always relied upon. The prospect of irrigated coffee certainly pleases, but the performances, on a large scale, may, conceivably, be vile. However, "nothing venture, nothing win" is a maxim that has a good deal to commend it, and as the capital necessary to start a fair-sized irrigated coffee estate would not be very large, if the worst came to the worst the the loss would not be very heavy. At all events the subject seems to merit the attention of practical planters, and we hope that, if any of them resolve to make the plunge, they will be rewarded on a scale proportionate to their merits.

Mr. C. Meenashaya writes:—

I have an experience of about 15 years in the culture of coffee under irrigation, both in Bangalore (Rock-Dale Park), and in Gouripuram, near Tumkur, where I now reside. In Bangalore I had planted 15 acres, and here, during the last five years, I have planted 40 acres. Having sold Rock-Dale Park six years ago, I have no precise information about the state of the coffee there. But, as far as my experience goes, the results have proved to my satisfaction that, with a never-failing supply of water and careful management, an acre of coffee trees planted 6ft. apart, and five years old, ought to yield from 6 to 7 cwts. The plants when three years old give a crop of from 4 to 5 cwts. an acre, a crop much too large and exhausting for their age; the next year they rest for recuperation, producing little or no crop, and from the following year they give a steady crop of 6 to 7 cwts. year after year. Of the 40 acres I have planted here, eight are 5 years old, ten 4 years and five 3 years; the remaining 15 acres need not be considered, being too young. My five-years-old 8 acres gave me in 1898 a crop of 2 tons, *i.e.*, at the rate of 5 cwts. for the whole eight acres, and this year I hope to get about 3 tons. My 4-year-old 10 acres gave me last year a ton and half, at the rate of 3½ cwts., but I hardly hope to get more than 10 or 12 cwts. this year, but the trees have thrown out an immense quantity of excellent wood, and are just now looking so healthy that even a crop of 4 tons next year would not surprise me. My three-year-old plants (5 acres) have a crop in different stages which I estimate at about 1 ton. My experiments in Bangalore produced similar results.

My system of cultivation is as follows. I plant my coffee 6ft. apart, and plant simultaneously quick-growing shade-tree seedlings, silver-oak etc., Coffee grows more sturdily and with a much larger number of primaries under the shade, but when the trees begin to bear the shade-trees grow sufficiently high to afford protection. After two or three good showers in the South-West Monsoon I get the plantation dug up like a potato garden or apple orchard. When that is completed, the plants are manured pretty heavily with a compound of cattle manure, tank-silt, and leaf-sweepings. When the North-East Monsoon sets in I give oil-cake, about a ton for five acres; but this is given only to plants which have commenced to bear. I start irrigation in the latter part of January and each plant is watered once a week. The irrigation is stopped with the advent of the South-West Monsoon. I commence picking in July, and this lasts off and on till January. But I must admit that the berries picked till about the

middle or end of August are comparatively smaller and poorer-looking than those picked subsequently. As the heavy pickings are from September to January, and as the quantity picked previously seldom comes up to even one-twentieth of the total outturn, there is practically no loss worth mentioning. This extended period for picking saves me the necessity of employing cooly-labour. My permanent staff of servants, who are at that period relieved from irrigation work, do the picking and pulping. As to the qnality of my coffee, Messrs. Binny and Co., through whom I sent a consignment to England, will bear testimony. In 1898, when the London market was exceedingly dull, my good kinds fetched 82 and 78 shillings per cwt. Dr. Lehmann, Agricultural Chemist to the Mysore Government, visited my plantation three weeks ago, and Mr. Cameron, of Lal Bagh reputation, so recently as the 4th instant, and both were greatly pleased with the condition of the plants, to say the least.

Assuming that my calqulations will be realised in the future also, (and I am sanguine about this) my 40 acres onght to give me from two years hence about 12 tons a year, or at the rate of 6 cwts. an acre, and this means, at a modest estimate, R10,000. Now comes the most important question, viz., wbat it wonld cost me to raise this crop. The purchase of land and sinking wells or other means of irrigation will be capital laid up, and tbis will vary according to local circumstances. I may mention here that when the plants are four years old and upwards, I water them once in three weeks or a month only, according to their condition, and this relieves the irrigation works to a large extent. I have a permanent establishment which costs me R200 a month, including my head maistry, which would suffice for even double the acreage, as in a couple of years more the irrigation work of tbe present plantation will abate considerably. I have an oil-mill of my own, which after paying its own expenses, gives me the requisite oil-cake. In addition to the above R2,400 a year, I spend about R200 for manure, and a margin of R100 for contingencies is allowed, making a total annual expenditure of R2,700, which ought to enable me from two years hence to raise a crop of 12 tons, which means a ton at an outlay of R225. But I have special facilities for collecting, for the mere trouble of collecting, a large quantity of cattle manure from short distances where the cattle of neigbbouring villages are sent out to graze, and I fortnnately possess a spring the water of which flows throughout the year from elevated ground into my plantation and irrigates abont 15 acres by gravitation. But R900 a year will more than adequately represent the money valne of these special advantages, which additional item, in the case of others, will bring up the outlay for raising a ton to R300. This cheapness in production ought to defy more than one Brazil and the threatened French Customs duty.

Having said so much about coffee under irrigation, I mnst frankly admit that there is one important source of danger to this industry under well-irrigation. It is patent that water-springs in some localities are gradually failing, especially where a large number of wells are worked. A 50-acre plantation would reqnire not less than 10 ordinary-sized wells. The constant drawing of water from so many wells must necessarily affect the under-ground springs in course of time, whereas a well or two only would canse no diminution. For a small plantation of five or even ten acres, nnless in specially-favoured localities, well-irrigation will answer all purposes, and such specially favoured localities can be had by careful enquiry. Bnt there ought to be no fear of future failure of water supply if lands are taken up for large plantations under any one of the magnificent tanks which the Mysore Government has constrncted and is constructing. I feel confident that the the Durbar, in its policy of progress under the sympathetic advice of the distinguished British Resident, will encourage the development of the coffee industry under snch gigantic tanks at Biuna-kanavay and Marikanavay by granting lands under special concessions. One very great advantage in raising plantations nnder such tanks will be that they could be irrigated by gravitation, and the expenses of sinking wells will be saved. Instead of "putting all his eggs in one basket" the planter could also grow various fruit trees.—*Madras Mail.*

BANANAS.

We have seen it stated tbat the Banana is one of the most extravagant plants known in its demands upon the soil, and very speedily exhansts it. We do not think so at all; on the contrary, there is comparatively very little taken from the land in a banana-walk by the crop,—not so much as by a crop of corn, and very much less than by sweet potatoes or any root crop, not so much even as Sugar Cane, and less than half a crop of tobacco does,—in fact we know of no common crop, except peas, which makes so light a demand. In saying so we may astonish many, bnt we adduce proof. The banana plant grows from a large bulb, it spreads a number of roots superficially and very widely; it builds up a stem or stalk ten or twelve feet high and a foot to six inches in diameter from bottom to top; this breaks into six or eight leaves, nine or ten feet long, and aboat a foot broad; it shoots forth a bunch of nine hands or say 120 bananas on a stem three feet long and, say, three inches in circnmference at the thickest, tapering to one and a-half inch. Now all that is taken away from the field is this bunch with tbe stem to whicb the hands are attached, and the trash or withered leaves which is used as packing to prevent damage to the fruit. If a planter is wise, he brings back all this trash or as much of it as the bnyers do not use for packing the frnit on the railway waggon. All the old bulb root and the long feeding roots through the soil remain to rot, the 10 or 12 feet of stem and the long broad leaves are chopped up and are dug or ploughed in aronnd the growing suckers, and the young roots of the ratoons thus find plenty of available food at once. In a wet climate so much rank, juicy matter dug into the soil may canse some sourness, bnt there is usually, in banana walks, enough lime in the soil to counteract this, and at any rate, the stems and leaves are not generally dug in at once, bnt lie drying and weathering for a time; besides, the banana is as rank and gross a feeder as a cabbage (and it would thrive on a dung-hill) and it takes a deal of rough feeding to give it indigestion. Then again, bananas have usually—nntil lately,—been planted as widely as 14 or 15 feet apart, even 16 in Portland, and when we consider how fast weeds and grass grow here, and tbat four to six hoeings are given a year, we can easily see how great a qnantity of hnmus is being turned in from weedings, in an area of seven feet ronnd each root. To be snre all this stuff—the stalks, leaves and weeds,—is not really an addition to the soil; it is not mannre in the sense of stable manure carted *on* to the land, but still the point is how really little is *taken from* a banana walk; at any rate, the rotting stalks and weeds form plaut food in a very available form for the roots of the growing plants to feed upon; and that the roots appreciate such, rather than having to search through the soil to get inorganic food in littles, we have only to turn over a heap of rotten weeds that have been hoed out a montb or two and left to decay. We should find a crowd of banana roots right under and throngh the heap. We think that when old banana walks begin to flag, even when cultivated, that they should be replanted in the middle of the old rows, and a free application of lime given to counteract probable acidity from the decaying of the old roots and stems and also to hasten decay. Or if this replanting may not be done, half a bushel of lime flung

round and into the old stool would have quite a rejuvenating effect. If anybody would place his nose near to the heart of an old stool, when one or two old roots are decaying surrounded by ratoons, the sour smell would soon convince him of the good a sweetener like lime could do.—*Journal of the Jamaica Agricultural Society.*

COFFEE-TEA.

To the Editor *Queensland Agricultural Journal.*

As you invited experiences *re* coffee-tea in the *Queensland Agricultural Journal* of March last, I am very pleased to send you mine. I acquired it when on a selection, on the road to Emu Park from Rockhamton. Having then an experimental plot of about twenty coffee-trees growing, and reading that tea made from coffee-leaves dried was very highly esteemed in some coffee countries, I determined trying it for myself. First, I dried leaves in the sun, but the product was disagreeably tasted when tried. Finally, I drieds some leaves in a camp-oven, slung so as to swing over a fire, keeping them constantly stirred until they were dry and fairly crisp. Tea made from them was much enjoyed by all who tasted it; and one who did was the editor of the *Rockhampton Bulletin* at that time, but dead now for years past. He greatly enjoyed it, and my wife and I liked it better than any tea we could purchase. I intend growing a few coffee-trees for the leaves only where I am now, as I am sure if it be only dried properly we could dispense with tea, provided we had sufficient coffee leaves to make our own tea from. To dry it properly is everything. It must be done quickly, and done to a turn; then it has an aroma and flavour that any lover of tea would enjoy.

THEODORE WRIGHT.

Wellington Point, 1st May, 1901.—*Queensland Agricultural Journal.*

DURABILITY OF AUSTRALIAN TIMBER.

The durability of timber in a structure will depend very largely upon the season when the trees are felled. As matters stand in Queensland, timber of all sorts is felled and hauled to the mills during the whole year round. Now, it stands to reason that some of this timber, when worked up, will not stand as long as others, for the simple reason that, at one period of the year, the tree is in full growing vigour, and the sap in full flow. In such a case it is easy to understand that, in the necessary process of seasoning, timber cut in this condition will shrink considerably, and will be weaker than it would have been had it been cut when at rest, *i. e.*, when the sap is down and the growth diminished. We see railway bridges and culverts built of timber often felled close to the line, and squared on the spot. Directly afterwards, this dressed timber is built into the structure. Then it is tarred or painted. Now, what is the result? The timber is full of moisture. This moisture is confined by the tar or paint, and fungoid diseases are provided with an excellent breeding ground at every joint. Then begins dry-rot. Instead of the logs, after or before dressing, being allowed to season and shrink by evaporation of the moisture contained in them, the shrinking goes on after the beams have been fitted in their places. Hence they warp and twist and open their joints, and the element of danger to the structure comes in.

Mr. James Mann, assistant to the Professor of Engineering at the University of Melbourne in his excellent work on Australian timber, says on this point:—

A slightly better condition is that of putting into the structure timber which has been felled during its dormant condition. It then contains the minimum moisture a live tree can contain; but it is only better in that it has completed its cycle of structural work, and is in the best condition for felling. It contains far too much moisture to admit of being placed in any important position.

Partly seasoned lies mid-way between unseasoned and well-seasoned timber. The latter, of course, is less likely to encourage fungus growth than any. But there are other advantages to be gained:—

1. There is little or no shrinkage. If green timber be used the amount of shrinkage is enormous, requiring the constant attention of a man to put in wedges and screw up bolts. This is almost unnecessary when seasoned timber is used.
2. The whole may be finished, tarred, or painted, without incurring the danger of dry-rot.
3. The timber also may be stronger.

The same authority says that one of the peculiarities of Australian timber is the great oxidizing effect it has upon iron. Place an iron bolt through a piece of partially seasoned eucalyptus, and in a few days there will be a very considerable coating of rust, while the bolt-hole will be blackened all round.

It is only natural that one should ask the question: *How shall we prevent this decay?* In the first place, *use seasoned timber;* it lengthens the life of the timber 100 per cent. Where seasoned timber cannot be used, *protect those points where decay will first appear*, and use every precaution in order to allow the timber to dry while in position.

Coaltar and paint, while preventing the water from soaking into the wood, also repel the attacks of insects. Hence, *a coating at the joints* when dry *will retard decay.* Do not paint unseasoned timber except at the joints.

If trees cannot be felled at the proper time, they may be ring-barked, and allowed to drain naturally. When felled they will be better than green timber.

As there seems to be a great diversity of opinion as to the necessity for tarring decks, beams, and piles, it may be stated that all the reports received of timbers that have been so treated confirm the opinion that *tarring increases* the life *of a structure.—Queensland Agricultural Journal.*

COST OF PRODUCTION OF COFFEE.

The following correspondence has appeared in the *New York Journal of Commerce*, in which the cost of production in Mexico and Brazil is compared:

"According to the owners' statements the cost of producing Santos coffee on the Fazendas Schmidt and Dumont, which probably have more coffee trees than any other plantations in the world, is four cents per pound bagged, ready for shipment on the plantation; five cents per pound in Santos; six cents per pound in warehouse in New York. At this price nobody makes any money except the brokers, railway companies and steamship lines. These figures are based on the average product of the plantation, which would probably be somewhere between numbers five and six, New York exchange standards.

"Of course, the smaller plantations cannot produce at the same price as the larger ones and the question of the survival of the coffee planter is getting to be largely a matter of transportation. Undoubtedly many coffee planters will be forced out of business from mere inability to pay their labourers for the picking of the coffee and the care of the plantation. Probably the first decrease in production will come from this reason. The planter whose shipping facilities are close to a railroad can perhaps make expenses at the above figures, but the one who must cart his product five or twenty-five miles to a railroad station must go to the wall. Of course, this applies with greater force to those planters in Mexico, Venezuela and Columbia, who must put a couple of bags of coffee on a "burro" and take anywhere from one day to five days' journey before they can reach a shipping point. All of them are at present losing money largely and it is only a question of time when they must stop.

"On the other hand those large plantations along the line of the Tehuantepec railroad in Mexico have a rate of freight of 50 cents per hundred pounds from the plantation to New York, as against 250 cents for the planter in Sao Paulo. These Tehuantepec plantations claim that they can put washed Oaxaca coffee in New York at a cost of five and one-half cents per pound. Now suppose the Brazilian planter receives nothing at all for his coffee on the plantation. It still costs him two and one-half cents per pound in New York in actual transportation expenses. It is probable that no one will dispute the statement that washed Oaxaca will always bring at least three cents per ponnd more than the average Brazil coffee. Consequently, while the Brazilian was getting two and a-half cents per pound for his coffee which wonld only pay the transportation expenses, the Tehuantepec planter would obtain five and one-half cents for his coffee at which price he could live, but not pay any dividends on his stock. There is no place in the world that can compete with him in coffee production, largely on account of his superior transportation facilities, and the superior quality of his product. Moreover, he can also raise rubber, pineapples, sugar, oranges, lemons and other products which pay a profit to reduce the cost of coffee production. A rubber tree shades his coffee tree and it costs him five cents per pound to produce the rubber after the tree is matured. The rubber sells for 65 cents. A handsome profit surely.

"Fortunately for the Brazilian the area suitable for coffee planting in this region is limited or the Brazilian would have harder competition than he ever had before. There is no doubt but that, were there area enough in Mexico along the line of this railway, all other coffee planters would be driven out of business, and no one in the world could compete with such plantations as the "Doa Rios" and "Uberos," run by American capital on American business principles, with a stable government and a railway depot on the plantation itself. Moreover they have two ontlets, one by way of Coatzacoalcos to New York and Europe, and the other via Salina Cruz to San Francisco and the Pacific Coast. This road is now being four-tracked so that it will be able to handle all the freight which is presented to it with facility, even to the extent of competing with a Panama canal, because the saving in ocean travel is several days in favour of the more northern ronte.

"The practical question of decrease in coffee is: "How long is the purse of the planter? and how long will he fight against what appear to be hopeless odds? and how can he pay his labourers for picking his product?

Note by Ed. B. R.—The cost of production of coffee as of everything else is a relative and not a positive quantity, and is a function of general local prices. The price of any commodity is entirely distinct from its cost of production, and is determined by the ratio of supply to demand. But if price decline in such a manner as to fall under the cost of production, it is clear that either the cost must be reduced or production fall off. If, on the contrary, as is the case with Brazilian coffee, production instead of decreasfng increase, the only logical conclusion that can be arrived at is that, however low prices may have fallen, they have not yet reached the limit at which production becomes impossible.

Because the cost of production may have ruled 4, 5 or 6 cents per lb. at one time, it does not follow that it will always do so, or even that it does so now. As exchange rises the cost of production declines, and the fact that Brazilian coffee has been sold as low as 5 cents in New York without stopping but rather stimulating production shows that the premises on which the whole argument of this correspondent is founded are unreliable. We do not pretend that at 5 or 5 1/2 cents planting can be very profitable. Indeed, if it leaves any profit at present it must be a very bare margin. But it does not, therefore, follow that it must be always so, or that, by reduction of cost the margin may not be considerably widened in a manner that would be probably, impracticable elsewhere.

In the first place a readjustment of charges to the altered circumstances created by the rise of exchange is ultimately inevitable. Not only must the current rates of wages be reduced, bnt railways and intermediaries of all kinds will be forced to reduce their charges also. Half a loaf is better than no bread: and if, as is stated, coffee at current prices is so unprofitable to the planter as to leave him only losses, the time cannot, evidently, be far off when they must be reduced or he must give up planting altogether and there will be nothing for the railway to carry? Long before that could happen, if, as the correspondent of the "Journal of Commerce" states, railway freights really represent a charge of 2 1/2 cents per lb or 100 % on the prime cost of the coffee, there must be a tremendous margin for reduction in that item alone.

The interest of the railways are indentified with those of the planter to the extent that they depend exclusively on coffee for their traffic, and would work at the bare cost of maintenance rather than shut np altogether. The very causes that are at present prejudicing the planter, viz. the rise of exchange and "overproduction", are a source of profit to the railways and make it easier for them ultimately to reduce their charges.

As regards the cost of delivery from the plantation in Mexico at New York, we have no means of verifying the statement that it rules only 50 cents per hundred lb, but it seems extremely low and probably, if correct, applies only to a limited area and does not include the cost of handling at all. Anyhow, the cost of delivery from Sao Paulo plantations which is put down at 250 cents per 100 lbs. is grossly exaggerated. The maximum freight charged in the Paulista railway, for example, is only 1$ 500 per *arroba* of 15 kilos, equivalent, at even the relatively high exchange of 12d., to only 112 cents per 100 lb, whilst, at 35 cents a bag, ocean freight amounts to 26 cents, thus bringing up the total to 138 in lieu of 250 cents per 100 lbs. We do not include duties and other charges as they have evidently not been included in the calculation of the comparative cost of delivery estimated for Mexico.

The railways engaged here in this traffic nearly all earn handsome dividends of 12 to 14 % and could, in Sao Paulo at least, probably reduce rates to half without losing money. On the other hand, coffee has been constantly carried to New York at 10 cents per bag without loss and could be again if necessary. So that, altogether, a reduction of carrying charges from 112 to 60 or 70 cents per 100 lb. is by no means an impossibility. The method of estimating the cost of production followed by the correspondent of the "Journal of Commerce" is, however, misleading and arbitrary. Brazilian coffee is now selling in New York at little over 6 cents, or 1/2 cent under what he estimates to be the cost of delivery, and has before been sold at 5 cents, the price he estimated as the cost of delivery at Santos. In spite of such low prices, however, coffee does not cease to be produced nor to be shipped, which certainly would be the case had the price really fallen under the cost of delivery. At 5 or 6 cents per lb, coffee may not leave much profit to planters, but before Brazilian coffees could be driven from the markets, there are wide margins yet to be reduced not only in the prime cost of production but of freight and handling. Should extensive cultivation prove too costly, it must be made intensive and labonr replace planters as proprietors, as was the case with cotton in the Southern States. But, come what may, coffee will never cease to be profitably produced, because Brazil possesses an almost unlimited area and climate suitable for growing coffee such as no other conntry enjoys.—*The Brazilian Review.*

FRUITS IN EGYPT.

(*Annual Report: British Chamber of Commerce of Egypt.*)

A tree of the orange tribe, known in India as the "Bael fruit," or Bengal Quince, (Ægle marmelos. Corr.), is very rarely seen in Egyptian gardens, but should be extensively cultivated if only for its long-recognised merits as an invaluable remedy in India in cases of dysentery and allied complaints. Its sun-dried unripe fruits, so common in Indian bazaars, do not seem to have found their way to Alexandria or Cairo though the liquid extract is official in the Indian Pharmacopœia. Another medicinal tree belonging to a different natural order (Leguminosæ) the "Khyar Shambar" of the Arabs (Cassia fistula L.) of which Hugh Liuddschoten the traveller tells us he saw more than a thousand trees in Egypt in 1580 A. D., mostly near Damietta, has almost disappeared, although an avenue of them is still to be seen in flower in the island of Rodah in June. Its laburnum-like flowers are highly ornamental and fragrant, whilst the pulp in its long cylindrical pods is a valuable laxative. The "Habbel Molook," or Physic nut (Jatropha curcas L.) is also rare in Egyptian gardens.

The "Mozz," Adam's fig or Tropical banana (Mussa sapientium L.), with some of its many varieties, including the Plantain (M. S. V. paradisiaca), has been cultivated in Egypt for many centuries, principally about Damietta, but with no pains to improve the quality of the fruit. This lofty species cannot be grown with success at Alexandria or anywhere near the sea in Egypt, without the protection of a very high wall, on account of continuous salt-laden sea breezes, and its cultivation has of late years been almost abandoned. During the last ten or fifteen years the low-growing Chinese species (Musa Cavendishii Lamb.) which grows to a height of only 6 or 8 feet, and is extremely prolific, has been cultivated with considerable success near Alexandria and in the interior. It is well-adapted to the climate, and fruit of excellent flavour has been produced. The Chinese banana is much cultivated in the Canary Islands.

Dr. Seemman (1) tells us that the species was taken to the Samoan or Navigator Islands by John Williams, the missionary martyr of Eromanga, from the Duke of Devonshire's seat at Chatsworth, and was carried thence in 1847 by the Rev. G. Pritchard to the Friendly and Fiji Islands where its introduction put an effectual stop to the famines which previously were experienced. It has now spread over the whole of Polynesia and has almost supplanted the "Musa Sapientum."

Of the latter species Simmonds (2) tells us that there are 17,000 acres under plaintain gardens in the Madras Presidency of India and 24,000 acres of bananas in Ceylon.

Sufficient bananas are already cultivated to supply the Egyptian market, and export has commenced; but it seems that the fruit from the Canaries, which makes a better show but is inferior in quality as regards flavour, is preferred to the Egyptian bananas in the French market. Direct export to England has not yet been attempted.

The import of bananas into the U. S. A. in 1892 was 13,000,000 bunches, valued at £2,000,000, mostly from Honduras, Jamaica and Central America.

The Mango (Mangifera indica L. is one of the best of Indian fruits, and, although unadapted to the Alexandria climate, has been for some years cutivated with success in the neighbourhood of Cairo and Ismailia; fruit of excellent flavour, although smaller than that grown in India, has been produced, and the markets are well supplied with it in August at a charge of from P. T. 1 to P. T. 2 per fruit.

As mangoes arrive in Egypt from Bombay in perfect condition, when wrapped in tissue paper and packed in boxes in such a manner as to prevent contact between the fruits, it is probable that a more extended cultivation would repay export to the Continent and Great Britain.

Dates are not cultivated in Egypt to such an extent beyond the requirements of the population as to become an important article of export. The varieties are numerous, some being of the size and form of a lemon, and others of a banana; but there is much room for improvement by the the extended and careful cultivation of the best kinds which are rare. Of the Nakhlet el Basha or Vanille date, (*facile princeps* in Egypt), Figari Bey tells us there were only, in 1865, four trees in the Ghizeh district near Bedrasheen, "Safr el Dunyeh" or Sultani, a large dry kind cultivated near Belbeis and Zagazig and of excellent flavour, is also rare elsewhere.

The average quantity of dates exported during the 15 years 1884-98 was 645 tons per annum, valued at £11,864 or at nearly L.E. 18 per ton. The export in 1899 was...892 tons valued at L. E. 14.221 and in
1900 „ ...834 „ „ 13.849
or at about L.E. 16 per ton. Of these Great Britain took more than one half, Turkey about 1/6 and Austria about 1/9. The import of dates is somewhat larger than the export; probably from the cheapness of inferior qualities from Turkish ports.

Out of a total import in 1899 of 1,061 tons valued at L.E. 8,187, 967 tons of Turkish dates were valued at L.E. 6982 or at a little over L.E. 7 per ton. On the other hand the superior quality of Tunisian dates of the best kind is evinced by 21 tons out of the above 1,061 tons imported from Tunisia being valued at about L.E. 657, or at about L.E. 31 per ton.

Shammam gawoon, &c., or melons (Cucumis melo L) and Batteekh, or water melons, (Citrullus vulgaris Schrad), although cultivated on a tolerably large scale (about 15,000 feddans in Upper Egypt and more than 20,000 in the Delta, much of the latter being sandy desert), are not sufficient to supply the Egyptian market at all seasons, and there is a considerable import of them. This amounted in 1899 to 2,492,863 fruits, valued at L.E. 23, 240 or at less than 1 P.T. each, all from Syrian or Turkish ports.

Of other fresh fruit in general, although strawberries during the last fifteen years have been abundant and of good quality in the market, there is much to be done in the way of improved cultivation and of acclimatizing new kinds. The loquat (Eriobotrya japonica Lindl) is much cultivated but the fruit is of inferior quality and not worth eating. The Guava (Psidium pomiferum L, and P. pyriforme L,) is no better) whilst the Pope's Apricot (Diospyros kaki. Thunb) of Japan is scarcely more than a botanical curiosity. The Roumman or Pomegranate (Punica granatum L.) which has been cultivated since the days of the Pharaohs all over Egypt, and as far South as Khartoum, and is of good quality in the Delta, especially near Rosetta and Damietta, ripens too late in the season (August and September) for the European market, and is more appreciated for the beauty of its flowers andfruit (especially the double-flowered "gulnar") than for the flavour of the latter. But as an economic plant it is most valuable, the powdered rind being in great request for tanning, and dyeing yellow Morocco leather, and as an astringent remedy in dysentery; whilst the root bark is considered a specific for tapeworm.

The Kishta or sweet sop (Anona squamosa. L.) is in common cultivation and of good quality; but the better species of Anona, viz., the Cherimolia (A Cherimolia Mill.) the Custard apple (A. reticulata L.) and the Bullock's heart or soursop (A. muricata L.) are never seen.

The Papaw apple (Carica papaya L.), which has a commercial value in the drug market from the "papayotin" extracted from the milk of its half-ripe fruits, and is a by-no-means unpalatable fruit to eat when at its best, thrives in Egyptian gardens, but is grown more for the sake of its handsome foliage than for the market.

The Barbadoes gooseberry (Pereskia aculeata, Mill.); the Granadilla (Passiflora quadrangularis, L.); the Water lemon (Passiflora laurifolia L.) the Cape Gooseberry (Physalis peruviana L) and the Cucumber Custard apple (Monstera deliciosa, Liebm) are all cultivated in gardens, but, with the exception of the last two, only for ornamental puposes, although they should all be market produce. Of the Sapodilla or naseberry tree (Achras sapota, L.), a good fruit, sold in the Calcutta bazaars under the name of "mangosteen," which it somewhat resembles but cannot be compared to for flavour, a fine old tree exists in the island of Roda which fruits annually; no other exists in Egypt.

The "Tamr Hindi", or Tamarind (Tamarindus indica L.), is cultivated in gardens and flowers well, but cannot ripen its fruit in the Egyptian climate. Two fruit trees which might be introduced advantageously are the Avocado Pear or subaltern's butter (Persea gratissima Gortn.) an excellent fruit, and the Litchee of China (Nephelium Litchi Camb.); the former is abundant in Algeria.

The total import of fresh frnit into Egypt is very considerable, and in 1899, omitting dates, melons and water-melons amounted to 51,691 tons valued at L.E. 44,079; more than 1/5 of the whole came from Malta and Gibraltar, the same from Italy and about 2/5 from Turkish ports.

Although a humble annual, the "Ful Soudani" or earthnut (Arachis hyogæa, L.), claims our attention as a larger export produce than dates from Egypt; and its cultivation, which only dates from the last twenty years, does not, as might be imagined from the Arabic name, belong to the Soudan, but to the Fayoum and Delta, especially in the Province of Charkieh. It is of South American origin although much cultivated in Central Africa and throughout the tropical world. The export from Egypt was in

1899 ... 1926 tons valued at L.E. 22.225 and in
1900 ... 1434 „ „ 16 763 or

at obout L.E. 12 per ton. Almost the whole export went to Turkish ports.

"The consumption of this seed," says Simonds, (1) "is held in such estimation for eating in the U.S A. (where it is known as the peanut) that flourishing sale stands are seen at almost every street-corner of New York. They are not much appreciated in England except by children. In America 3½ million of bushels are sold annually. There are full 750,000 bushels (18,750 tons) sold yearly in the city of New York alone. Previous to 1860 the product of peanuts in the U. S. A. did not amount to more than 150,000 bushels (3,950 tons). and of this total nearly 5/6 were from North Carolina. It was estimated that Virgina, Tennessee, Georgia and Carolina, sent conjointly over 3,000,000 bushels (75,000 tons) to market in 1886, of which 1/4 went to New York. As much as 10/- to 12/- is paid for the bushel (£20 to £24 per ton). The yield is from 80 to 120 bushels per acre." Apart from the question of food the earthnut is a valuable plant for the oil contained in its seeds and pods, the former containing 45 0/0 aud the latter 30 0/0 of oil; they make an excellent but expensive oilcake for feeding cattle.

The cultivation of Henna (Lawsonia inermis, L. and L spinosa, L.) represents abont the same export importance as dates and earthnuts. It is cultivated, like the latter, almost entirely in the Delta and province of Charkieh. The average export of the powdered leaves during the 15 years 1884-98 was 1,115 tons per annum, valued at L.E. 15,025 or abont L.E. 13·5 per ton.

1899 ... 1178 tons valued at L.E. 18.246 and in
1900 ... 1294 „ „ 21.036 or

at from L.E. 16 to L.E 17 per ton. Nearly the whole of this went to Turkey, Tunisia and Algeria. None goes direct to great Britain but a portion of the small export to Malta, valued at L.E. 74, may find its way there for the purpose of making hair-dye. The Henna is cultivated throughout India, as a hedge plant and in gardens, for the same purposes as in Egypt, and also as a hair dye. The glossy jet-black colour of the hair so prized in the East is obtained by dyeing first with henna and then with indigo powder, each being made into a paste for that purpose. with a subsequent application of castor oil. Certain Moslems prefer only the first part of the operation and leave the hair of a brilliant red, dyeing the manes and tails of their horses of the same colour.—*The Egyptian Gazette.*

THE COMMON DATE PALM.

CAN IT BE GRAFTED?

To the Editor of the Egyptian Gazette.

Sir,—I shall be glad if auy of yonr correspondents can inform me, by means of your columns, of an instance they have known of a successful attempt to graft the common date palm. An Algerian agriculturist, Count de F.—who makes the cultivation of this tree a speciality—has recently pointed ont to a traveller at Biskra a date palm which he said he had himself grafted in the ordinary way when it was between five and six years old; this tree has now three branches or stems at its summit. The count informed the traveller that, for the pnrpose of grafting, he had made use of the young shoots, known to the Arabs as "ragab," which, occasionally, are fonnd in the axils of the lower leaves near the base of the tree and are much smaller than those arising from the rhizomes beneath the ground (known as "jobar") which are the usual means of propagating the date palm. The fact of the existence of the triple-crowned stem is indisputable; but that it has resulted from the ordinary process of grafting appears almost incredible.

The curions mode in use in Egypt of continuing by "layering" (marcottage) the propagation of a valnable kind of date palm, which is deteriorating without any young shoots by which to replace it, has been accnrately described by Figari Bey in his "Scientific Stndies in Egypt." In this case, a cylindrical hole is bored, horizontally, in the stem, about six inches in diameter, at twelve feet from the summit of the tree; in this is placed a corresponding piece of wood, projecting at each end, to which is attached, below, a sort of sack, made of matting and filled with good earth and mannre, which is carefully watered every few days for nine or ten months; the npper portion of the trnnk is secured by ropes to neighbonring trees dnring the above-mentioned period. When the new roots are well formed (after expiration of ten months) the tree is sawn through near the base, and carefnlly lowered down, the newly rooted part being then removed and planted in the place previously prepared for it. In two years, if not too old, it will give excellent fruit of precisely the quality of the original tree. With care, date-palms forty or fifty years old many be safely transplanted. But "grafting" a palm tree is a long way in advance of any snch process as the above, and I should like to bo convinced.—*Egyptian Gazette.*

I am, etc.,
Appella.

To Preserve Young Limes.—Millions of limes go to waste every year in this island, which with very little trouble and slight cost conld be made into a delicious and very saleable preserve. The following method of preserving young limes will be found useful:—Use limes not over ¾ inches in diameter. Prepare brine by dissolving salt in water until an egg will float, in which place the limes for from ten to fourteen days; then cut these in halves and scoop out the pulp; boil the skins in two or more waters nntil the salt and essential oil are removed; stew them in syrup made from white grannlated sugar. If crystallised limes are required, after they are stewed dry them and dip them several times in thick syrnp, drying them after each dipping.—*Journal of the Jamica Agricultural Society.*

CEYLON AND JAPAN TEAS IN CANADA.

I.

The following letter, signed "P C Larkin, Toronto," appears in the *Canadian Grocer* :—

"We read with much interest in this week's issue your article headed 'Japan Tea Market Injured.' In it you state that the Japan tea market has been 'difficult to understand,' and you go on to state that, in spite of the material diminution in the amount of imports, the market has weakened rather than stiffened.' We personally, and without prejudice, cannot see that there is any reason for surprise. It is quite apparent to us that you have overlooked the strongest factor of all in bringing about the decrease of the demand for Japan tea, and that is, the green teas of Ceylon. Every wholesale house has, by this time, recognised the fact that there is no future for Japans, and that there is a great future for Ceylon greens in Canada. Consequently, not only the wholesale houses, but every bright retailer as well, are afraid to stock up with Japan teas, wishing rather to adopt a hand-to-mouth policy.—*Home and Colonial Mail*, May 31.

II

(To the Editor of the "Home and Colonial Mail.")

DEAR SIR,—Being an old Indian planter, and having been engaged in the Indian and Ceylon tea business in Toronto (Canada) for many years back, I have taken a great deal of interest in the many proposals made to better the state of the tea market. And while watching with much interest the very energetic campaign that has been carried on by Ceylon for some years, and which has shown such great results, especially here in Canada, I have been surprised, as well as disappointed, that as much, at least, has not been done by India. They did have an energetic and able representative in the United States for three or four years, with a small amount of money at his command with which to advertise; and he effected wonders, I think, with the amount at his disposal. But what is wanted to turn the consumption of the one hundred million pounds of Japan and China tea, that is now consumed annually in the United States, into a consumption of Indian and Ceylon tea, is the expenditure in advertising, for the next three or four years, of at least forty or fifty thousand pounds sterling per annum. This, well spent in the daily press, would force Indian teas on the attention of all tea drinkers; and I venture to say that in five years from now over fifty million pounds of Indian tea per annum would be consumed in the United States.

You will ask how this money is to be raised Well, why can it not be raised as I understand the planters of Ceylon have raised theirs for years back? The imposition of an export duty of one-sixteenth of a penny per pound on all tea exported from India would create a revenue of £45,000 per annum ; this is, basing the calculation on the output of Indian tea last year, and the expenditure of such a sum would enhance the value of Indian tea twenty-fold the amount expended.

It may be said that the planter is not in a position to stand this one-sixteenth of a penny per pound. The question just occurs to me, who would pay it? Would not the consumer pay it in the long run, instead of the grower or exporter ?

In any case I consider that a real live campaign carried on in the United States is the only feasible plan that will bring about the position so much desired by us all.

If one wants to see a recent result of advertising, I have only to point out the progress which Ceylon green teas have made in Canada during the past eighteen months. One firm to my knowledge, the "Salada" Tea Company, has for months back taken, on regular orders from one garden in Ceylon, over four hundred half-chests per month. Practically every wholesale house in Canada is now handling Ceylon green teas, and they are all predicting that they will entirely displace Japan teas. This has been brought about, first, by superior quality, and, secondly, by the tremendous advertising that "Ceylon green tea" has received. To the Indian planter the moral is : "Go thou and do likewise."—Yours faithfully,

ROSS W. HAYTER.

50, Front Street, East, Toronto.
May 16, 1901.
—*H. & C. Mail.*

WHY NOT FIGHT MATE TEA IN SOUTH AMERICA ?

80 TO 100 MILLION LB. OF THIS "HOLLY" MATÉ TEA CONSUMED.

It may come as a surprise to many people to learn that no fewer than from 80 to 100 million lb. of the indigenous tea of Brazil and Paraguay are consumed in the South American Continent. From Brazil alone 30 millions lb. are said to be "exported"—that is to countries farther south, such as Argentina, where the consumption of Maté is said to reach to 15 lb. a head per annum. All this we learn from the account we republish in our daily and *T.A.* of "Maté," from the latest edition of the "Encyclopædia Britannica." [The new edition or Supplement now in course of preparation will no doubt have later information.] It will be observed that Maté tea is really made from a kind of ilex or holly and, as apparently there is no cultivation of the plant, even the widespread forests of Brazil and Paraguay cannot supply groves of the ilex for ever, although perhaps the cutting of branches in the manner described, by the Indians, does not do permanent injury to the trees. Be that as it may, we cannot see why the people of the South American States—in Argentina especially—should not by degrees be won over from Maté to Ceylon and Indian teas. Already a few million lb. of our teas as reported by Messrs. Gow, Wilson & Stanton, are taken for South America and, if some trouble were taken to exploit the States concerned, or their capitals at least, with samples of our stronger teas, it is quite possible that the supersession of the indigenous article, Maté, might go on a good deal quicker and that no inconsiderable quantity of our teas, and one yearly increasing, might be taken by South America. We commend the subject to the attention of the "Thirty Committee."

CEYLON GREENS FOR AMERICA.

HOW THEY MUST BE MADE: TO WIN FAVOUR IN THE WEST.

We have pleasure in giving prominence to the following letter to a Colombo firm from its Agents in the United States, in which it will be seen that valuable suggestions are made for the manufacture of green teas to suit the American market. We feel sure that all engaged in making greens so far will give them their careful attention, even if the time be not yet ripe for the measure suggested. With the expansion in our trade in green teas, the Ceylon Planters' Association should certainly consider the proposal made, more especially if the market for black teas is not to recover, as at present it shows signs of doing. The imitation of Japans, however, would not be confined to greens only, as the last paragraph shows:—

May 20th.

We note from late advices that the proposal of the India and Ceylon Association for the reduction of out-put has fallen through, and therefore the importance of finding other outlets for India and Ceylon Teas will become a matter of extreme importance to those interested in India and Ceylon Teas. Of late a good many so-called Ceylon Greens have been sent to this market, and have attracted some attention, but we feel convinced that there will not be a ready sale for this new description of Tea unless their manufacture is somewhat altered. If the leaf can be made to closely imitate Japan Teas, both basket-fired and panfired, we believe that there would be a great opportunity and a small fortune for those who are first in the field. To accomplish this, it would be necessary to have a firing establishment in say Colombo (and Calcutta, if the Indian Teas prove serviceable for the purpose) the same as exists in Yokohama and Kobé. The leaf would be brought down in the semi-raw state, viz., once fired, and then treated and manipulated in the same manner as Japan Teas. It would also be necessary to have the Teas packed in half chests, matted, and faced in the same way that Japan Teas are treated. We are forwarding to Ceylon a small quantity of Japan Green Tea for the purpose of ascertaining whether they can manufacture this leaf to imitate closely in appearance Japan Teas. If they can do so, the cup quality of Ceylons would certainly give them a distinct advantage over Japans. The annual export of Japan teas is approximately 40,000,000 lb., and if this trade can be diverted to Ceylon and India, the Associations interested in these classes of tea would certainly be greatly benefited. Our suggestion is that a Company be organised for the purpose of establishing firing establishments in both Calcutta and Colombo, provided, of course, that we are able to ascertain by experiment that our suggestion to imitate Japan teas is a feasible one. In a venture of this kind, we should be willing to subscribe liberally, and we think that both the India and Ceylon Associations should make some considerable concessions to the pioneers. The question is as to the best and most expeditious method of taking up such a venture. It seems to us that it would be necessary to form a small Company of those interested and obtain some skilled Japanese labor to initiate and start the manufacture. Speaking in general terms, we think that the export of such teas should be confined to one or two houses in the States and Canada.

We are sending you, by today's mail, samples of Japan teas that we suggest imitating. You will notice that one is a long black leaf tea called "Basketfired" and the other is the regular style so-called "Panfired." We feel sure that the latter can be imitated very closely. Whether or not leaf is obtainable in Ceylon and India similar to the Basketfired, is another question, of which you are the best judge. Please advise us as promptly as possible what suggestions you have in this matter.

PLANTING RUBBER IN BRAZIL.

An occasional correspondent to our contemporary, *The South American Journal*, writing from Para, advocates the cultivation of rubber trees as follows:—The Government of this State could do very much to draw large amounts of foreign capital here by offering sufficient inducements for the establishment of rubber plantations. At present all the rubber exported is collected from the virgin forests; the trees are widely scattered, and the collecting of the rubber takes much time. If plantations were made, ten trees could be placed in an area now occupied by only one, so that a man collecting could work four or five times the number of trees that he can attend to now, resulting in a much greater production of rubber per man, consequently more profit to all concerned. Here is the natural home of the rubber tree, and the quality of the rubber is the best in the world.

About four or five years ago, a law was passed by the Legislature of the State, offering a premium of one conto of reis for every two thousand trees planted; that it has but little or no effect shows that the inducements offered are not sufficient; that it would be well if the Government would offer more. Suppose the Government were to offer, in addition to that now offered, half the export duties of all rubber from such plantations for a term of years, and exemption from all taxes of whatever sort for the same length of time, and make these terms known throughout the world. It seems credible that it only requires something of the sort to draw large amounts of foreign capital here to establish rubbish plantations. Millions of dollars have been invested in such plantations in Mexico and other places, and millions of trees have been and are now being planted every year; if something of the sort is not commenced here pretty soon, this country may have an unpleasant surprise some day not very distant. With sufficient inducements, millions of pounds would pour into this State to establish rubber plantations, which would revolutionise the whole rubber business of the world. Public land can at present be bought from the State on very favourable terms, from one milrei per hectare up, according to location and quantity of land required. The Governmenment would not be required to spend any money in this enterprise for some years to come, and compared with the benefits to be derived, the sum to be paid in the future is very little. It is certain that it is worth all the privileges that might be offered as above, because Nature alone and unaided will never establish such plantations; they will only be planted by enterprising men, backed by large capital, and with the hope and expectation of large gains.—*India Rubber Journal*, May 13.

INDIAN TEA EXEMPTED FROM FRENCH IMPORT DUTY.

Private telegrams received in Pondichery state that the French Government has decided to exempt

tea and coffee imported into France from British India from the prohibitive tariff, which comes into force next January. The favourable solution of this important subject—which will be hailed with thanksgiving by the large community of planters thoughout India—is in a great measure due to the exertions of Monsieur Yves Guyot, editor of the Paris *Siècle*, who has thoroughly studied the conditions of the case.—*M. Mail.*

BENGAL AND MADRAS INDIGO.

THE CUSTOMS DUTY IN EGYPT.

Calcutta, May 14.—The Bengal Chamber of Commerce has addressed the Government of India, drawing attention to the very heavy incidence of the Customs duty in Egypt on Bengal indigo as compared with the duty imposed on Madras indigo, which has worked adversely to the interests of Bengal indigo, and requests that a fairer basis of assessment should be arrived at, more in accordance with the relative values of the two descriptions of indigo. The difference in the tariff rate between the two descriptions of indigo is extremely disproportionate to the prices ruling for the past three years. The average price of superior Madras qualities has been R50 to R55, while the average price for ordinary Bengal qualities has been R60 to R65 per maund of 25lb. The difference between the ruling rates of the two qualities is under 17 per cent., while the difference in the tariff rates on which duty is charged is about 45 per cent., thus giving the Madras dye an enormous advantage over the Bengal product. The Committee is informed that the Customs duty in Egypt on all foreign goods and produce is 8 per cent *ad valorem*, and it is clearly apparent that Bengal dye is valued too high for the purpose of levying duty. The equivalent of 8 per cent. on 48 piastres, the Egyptian valuation for Customs purposes of Bengal indigo, is nearly 4 piastres per kilogramme, while the equivalent of 8 per cent on 28 piastres, the Egyptian valuation for Customs purposes of Madras indigo, is only a little over 2 piastres per kilogramme. The method of assessing duty on indigo which at present prevails in Egypt is unfair and requires re-adjustment. The Committee does not ask any concession in favour of indigo cultivated in one Province to the detriment of that cultivated in another. It simply desires that the whole of the indigo exported from India to Egypt should be placed on the same footing as regards assessment of duty in the latter country.—*Madras Mail.*

MEDICAL INVESTIGATIONS IN INDIA.

THE MALARIA COMMITTEE.

The delegates of the Malaria Committee of the Royal Society, Doctors Stephens and Christopher, whose main object in visiting India is to seek for and investigate cases of black-water fever, a most deadly disease to Europeans in Central and West Africa, and some cases of which have been reported from the Dooars, Sylhet, and other malarious localities in India, are now at Simla, where the following plan of work has been arranged, in consultation with the Sanitary Commissioner with the Government of India:—Dr. Christopher goes to Mian Meer and Amritsar to make preliminary arrangements for the autumn campaign (in co-operation with the Medical Officers of those military Cantonments) against malaria. He then joins Dr. Stephens in Calcutta, by which time Captain S P James, I.M.S., will have returned from China. All three will then go to Darjeeling, the Terai, and the Dooars to investigate the black-water fever.—*Madras Mail*, June 19.

CINNAMON IN LONDON.

The information which the last English mail has brought does not disclose any special features in the Quarterly Auction of Cinnamon held in London on the 20th ultimo. The tone of the sale was quiet; and naturally so, in view of the large leavings from the heavy catalogues of February, when 2,132 bales had offered. The offerings last month were a fairly average quantity, having been 1,088 bales, against 1,058 at the corresponding auction last year. It was, therefore, scarcely to be expected that the fall in prices experienced in February would be recovered, the more so as heavy shipments of bark continue from this side, although the amount is not as large as it was last year. Unless there is a rush soon, following the big harvest which is now fairly on, prices may be expected to recover somewhat. It would be something, even if they were maintained, looking to the dullness of trade and the unhinging of business through the prolongation of the troubles in South Africa and China, the shuffling which there has been in the home duties on produce, and the recent scares in Wall Street and the London Stock Exchange.

As it was, more than half the quantity of spice offered was sold at prices which were on the whole satisfactory, and should pay producers. Whether they leave any profit to middlemen is another matter. Local traders are rather fond of paying fancy prices when there is a demand, hoping to make a profit by mixing with coarse bark, and they often burn their fingers, as London buyers are wide awake. The fate of shipments of wild cinnamon is proof of this. It may take some time for traders to recover who have embarked in "wild," but with stocks fairly easy in London, there is room for legitimate trade.

We quote as follows from the Report of Messrs. Forbes, Forbes & Co., Limited:—

London, May 21.

Cinnamon.—The periodical auctions were held yesterday and went off with a very quiet tone. The total offering was 1,088 bales plantation quill, compared with 2,132 bales at the February sales, and 1,058 bales at this period last year. Of this supply only 77 bales were good and fine "worked" quill. The steamer "Stentor" with fresh parcels of fine &c., some 240 bales, only arrived in the river yesterday, *via* Amsterdam, and her shipments were consequently shut out.

There was scarcely any change in prices, the 77 bales "worked" realising about last sales' rates and 621 bales "unworked" going irregularly and occasionally easier.

"Worked" firsts brought 11d to 1s 6d, seconds 9d to 1s 5d, thirds 1s 1d to 1s 4d and fourths 7½d to 11d per lb.

"Unworked" firsts sold at 9d to 1s; seconds, 8d to 10½d, thirds 7½d to 10d, fourths 7½d to 9½d per lb.

Of about 850 bags chips &c., only a few bags sold at 2¼d per lb. for coarse.

Wild Cinnamon.—About 212 bales and 578 bags were offered and passed without bids. Present stocks 3,187 bales Ceylon, 2,666 bales "wild." 3,515 bales chips and 8,373 bales of wild bark, &c.

The next sales will be held 28th August.

PLANTING IN TRINIDAD.

CACAO—RUBBER—COCONUTS.

From "Trinidad and its Future Possibilities,"—a paper read by Sir Hubert Jermingham, ex Governor, before the Royal Colonial Institute, we quote :—

Trinidadians have every reason to take time by the forelock, for they possess a soil which can grow anything and everything. The cacao trade, which comes next in importance to the sugar trade, is one which, however remunerative, does not give work to many hands, though fortunately it is one in which the native Creoles take an interest, and the coolies are beginning to invest their savings. It is a trade which flourished in Trinidad up to 1827, when, owing to the fall in prices, it gradually dwindled to nothing, until in 1856 there were no more than 7,000 acres under cultivation. As the average yield per acre is 600 lb, or 2 lb per tree, some idea of the development it has now reached can be gathered from the fact that there are at the present time nominally 498 cacao estates, yielding 173,000 bags, or 29 million pounds of cacao, hence representing some 48,000 acres under cultivation. It is estimated that the cost of production of a bag of cacao containing 165 lb is 34s, while the sale price average for the last two years has been 75s a bag, representing a total of more than £600,000, of which half was clear profit and half was expended in the Colony. The demand is so much on the increase that prices maintain themselves in spite of accumulations and of old methods of growth; and the providential dispensation which places Trinidad outside the hurricane zone is also the guarantee of her future prosperity from this one article, if she had no other to rely on; but a great impulse has been given within the last three years to the cultivation of rubber, and this important article of commerce is expected to rank eventually as one of the most remunerative of the Colony's resources. Thanks to a Swedish Professor of botany and natural history, Professor Bovallius of the University of Upsala, who was introduced to me by letter from the Secretary of State, I modestly hope that I have had a slight share in the impetus given to this new industry from which so much is expected.

Professor Bovallius assured me that he had not seen along the Orinoco river any land better suited to the growth of Hevea or Castilloa than that which Trinidad affords, and he has since proved his confidence in the soil by the purchase of some 4,000 acres of Government land and the launching of the Narva Estates Co., Ltd., for the cultivation of rubber, cacao, and indigenous products.

I wish I had the time to explain to you how these estates, situated in, I think, the loveliest parts of the island, and selected with the greatest care and knowledge, are expected to give returns in the eighth year, when the rubber-trees yield their milk, which are simply astounding to one who, like myself, has no money to invest.

But as the company is formed on what, I think, is the safest basis of investment in land, when the investor does not reside on the spot, viz., on a syndicate system, in which dividends are paid *pro rata* of the shares held after a lapse of half the time necessary for the produce plants to bear, it may be useful to point out that, in the case of a rubber plantation, which takes eight years, the coconut trees, the bearing cacao trees, the hardwood and the corn are made to pay full interest on the capital for four years, and a dividend after. On the Narva Estate, for instance, I see by the prospectus that at the start there are sixty acres of bearing cacao, equivalent to £1,200 a year, and coconut trees yielding nuts worth £750; while hardwood is expected to realise £400, and fifty acres of corn a further £200, in all £2,550, which is more than necessary to pay 8 per cent on the gross capital of the company in question, viz. £25,000: that this revenue increases to £3,000 the second year, £3,450 the third year, £4,800 the fourth year, and to £7,300 the fifth year, owing to enlarged acres of both bearing cacao and coconut trees. In the fifth year it exceeds by £2,500 the cost of working the estate in that year, that cost, inclusive of interest, being estimated at £3,475 the first year, £3,930 the second year, £4,360 the third year, £4,915 the fourth year, and about the same in the fifth.

However correct these figures may be, they are so far reliable that, provided the cacao trees are bearing as well as the coconut trees, 8 per cent interest on capital is secure, though a deficit on working expenses, averaging £700 a year for four years, is expected.

But in the fifth year the balance of revenue covers that deficit and a dividend of 9 per cent becomes possible. The prospectus after that becomes aggressively alluring. Before the rubber adds its 100 per cent, the sixth year gives a dividend of 33 per cent, and the seventh year 44 per cent, and, although I am not quite capable of understanding such high profits, there is no reason, with the prices which cacao and rubber command, that this should not be realised, seeing especially that cacao is daily becoming more popular throughout the world as a nutritive beverage, and the demand for pure rubber is far in excess of the supply; and it will be interesting to note when the time comes how wise they have been who have asked of the soil and vegetation of Trinidad for returns equivalent to those of the best minerals elsewhere.

I have mentioned coconuts, and most people do not realise their value in the economy of nature.

In Trinidad these trees thrive particularly well, and especially so in the district of Mayaro, where the finest cocal, or coconut walk has curiously planted itself from nuts originally cast ashore from a wrecked vessel.

These trees bring forth a bunch of nuts every month, and the bunches average nine nuts each. Sixty good nuts go to a gallon of oil, and this gallon averages $1, or 4s 2d. The yearly value of a coconut tree is therefore roughly set down at $1, from which it will be seen that 9,600 coconut trees are sufficient of themselves to pay £2,000 interest, at 8 per cent, on £25,000.

In 1899 some 13,000,000 nuts were exported, representing 118,000 trees at least, and £45,000. As there are sixty nominal coconut estates in Trini-

dad, each estate exported on an average produce of the value of £740, and this sum, at 8 per cent, is interest on £9,250, a fact not be despised when a coconut walk is advertised for sale.

I will not weary you with Indian corn or maize, which gives two crops a year, and is only inferior to wheat as a nutritive aliment; or with rice, which is imported to the extent of £150,000 a year, and could be raised in the island for more than twice that value, were there proper appliances to thresh and clean the grain ; or with coffee, every grain of which finds a sale in the local market, as Verdant Vale can testify ; or with tobacco, which has been pronounced as good as the Havana leaf : alas ! the secret of the curing rests with the Cubans and no one else—nor of the fruit, which is a drug in the markets of the Colony, and awaiting the success of Messrs. Elder, Dempster & Co.'s plucky venture in Jamaica; nor, indeed, of the spices, vegetables, and other riches which the marvellous soil offers eagerly to all who seek them ; but I will point out in a few words the mineral wealth of which the Colony can also boast.—*Journal of the Royal Colonial Institute.*

SCHOOL GARDENS AND NATURE STUDY.

MR. J. C. WILLIS' EDUCATIONAL LECTURE.

(*Special Report.*)

Mr. J. C. Willis, Director of the Botanical Gardens, Peradeniya, lectured to a large audience at the School of Agriculture last night on *School Gardens and Nature Study.* The chair was taken by the Bishop of Colombo. The lecture was of a different kind to those of the educational series that preceded it. It did not deal with the best and most practical methods of teaching particular subjects to junior classes : but had an altogether wider scope. It dealt with a new scheme for the teaching of Agriculture in Ceylon, a scheme already drawn up and ready to be put in practice. The lecturer did not begin at once by unfolding this scheme.

Mr. Willis began by laying stress on the need for improvement in agriculture in Ceylon, and by pointing out what sort of character must be developed before any improvement could take place. He said that at present all the efforts made by his Department to push the cultivation of plants that could with advantage be grown more largely here, such as cacao and cinchona, were unavailing owing to the resistance they met with through the ignorance of the people. There was also a constant waste [of materials owing to this want of knowledge. In Jaffna, where there was less ignorance, the scanty soil was made to produce more than was produced by the richer soil of the South-Western Province. Constant complaints were being received by Mr. Green against insects as pests, when, in fact, these very insects were often not only harmless but actually beneficial to the plants. The only way to combat these and the many other evils of ignorance was by

THE TRAINING UP OF A MORE SCIENTIFIC SPIRIT.

There must be developed a capacity for taking accurate observations, and for drawing accurate conclusions from them. It might be remembered, said the lecturer, that it was by close and accurate observation that Sherlock Holmes spun those wonderful theories of his, whose correctness was proved so conclusively in the Police Courts ! For a proper scientific training there should be first accurate observation, then the collection of facts, then their classification, and lastly the deductions drawn from them and their application to life. The Germans were much ahead of us in their application of science to practical things. By their superiority in this, they had succeeded in crushing out the aniline dye trade in England, and they would very soon succeed in crushing the Indian Indigo industry as well.* Both with nations as well as with individuals, those who chose to neglect science must be content to fall behind in the world's race. It was in the training of those still at school that the greatest hope of improvement lay. Children were by nature more observant than adults, and their faculties of observation should be encouraged. It was with a view to this that

A SCHEME FOR SCHOOL GARDENS

had been brought forward by the Director of Public Instruction in conjunction with the Director of the Botanical Gardens. Though the scheme was new here, it was not in New York where Professor Bailey (?) of the Cornell University had made it a great success. The gardens should be quite small, and useful and ornamental plants should both be grown. The seeds would be supplied by the Botanical Gardens, and a travelling Superintendent would be sent to visit and examine these gardens from time to time. They should be made to look as pretty as possible, and every scholar should grow a plant by himself. Circulars as to the laying out of the gardens, and leaflets with lists of plants would be supplied by his Department, and the master and pupils should make out the plan of their gardens together. The products of the garden should be studied for object lessons. Leaflets to assist the teachers in this would be sent them. The object lessons would need preparation and should be as informal as possible. The pupils should also be taken out into the fields and jungle and should be made to describe the things that they had seen. If they made inaccurate observations, they should not be corrected, but should be sent back to examine the things afresh. No other person's observations should be accepted by them without their being proved by themselves.

FORMER SCHEMES

for agricultural teaching in rural schools had failed because too much had been attempted. Another reason had been that

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* The German Company here referred to, is, we have ascertained, the Badische Co. Staufenfels. It employs 148 skilled chemists, 75 engineers, and 305 clerks, and makes a substitute for indigo by a synthetic chemical process. This product does not decay nor change its colour, and can be made much more cheaply than indigo can be grown.—This is how Germans make use of their technical education !—Ed. *T.A.*

the teaching was not by scientific methods; it had been too dogmatic. A child should not be crammed with information; it should be taught to observe for itself. Formerly we had attempted to go too fast, but in this scheme we were preparing to go slowly, and more surely.

At the conclusion of Mr. Willis' lecture there was general applause. The seriousness with which it had been listened to was relieved by Mr. Philip Morgappah who made a few remarks on the benefits to character that resulted from a life devoted to agriculture.

Mr. JAYATILLEKA said he thought the scheme more applicable to village schools than to town schools, for town schools rarely possessed the luxury of a garden.

Mr. W A DE SILVA remarked that the scheme was not really new. It had been tried here before and had failed, but no doubt Mr. Burrows and Mr. Willis together would make it succeed. The practical difficulty had been in getting gardens; also in getting time. The teachers could seldom devote more than half-an-hour to this lesson, and the boys needed all their time to prepare for the ordinary school examinations.

Mr. F LEWIS said that one of the many difficulties in the way of teaching agriculture in Ceylon was the many kinds of climate to be found here. For instance, the rainfall in Anuradhapura was totally different from what it was in Colombo. No doubt there was a great deal of ignorance of agriculture among the natives. A native knew much more about the cultivation of paddy than a European, yet he had never learnt to select the seed. Year after year the ground was sown with the same seed, and the crops grew poorer and poorer. But at Tissamaharama, where seed had been imported, and the land allowed to lie fallow for a time, the good results had been shown by the great increase in the crops.

Mr. S. M. BURROWS said that it was their intention that the experiment should be extended not only to Government Schools but also to Grant-in-Aid Schools. In his opinion nature study was applicable to town schools as well as village schools. In town schools there was a possibility of forming School Museums in which botanical specimens would take a large place. It was true, as Mr. de Silva said, that former schemes had failed, because they had not been given a fair chance. This time the scheme would only be developed in those schools which possessed or could possess gardens; and time for the proper study would be made in the curriculum. One good result he hoped from this scheme was that children would learn to love school.

After a short

SPEECH FROM THE BISHOP OF COLOMBO

—a very graceful one, in which he spoke of a knowledge of agriculture cheering old age; of a story from Virgil of an old man who had not enough land for grazing or ploughing, but only enough to grow lilies and cabbages, and yet who was as happy as a king and felt himself rich,—the meeting was concluded with a vote of thanks to the lecturer and chairman.

THE CESS (FOR INDIA) AND THE TEA CRISIS

EXPERIENCED GARDEN MANAGERS AT THEIR WITS' END TO DO BETTER THAN THEY HAVE DONE. THEY LOOK TO A DOUBLE CESS FOR INDIA AND CEYLON. COLOMBO SHOULD BE THE GREAT DISTRIBUTING CENTRE FOR INDIAN AND CEYLON TEAS.

(*From the Indian Garden Manager's point of view.*)

I have received, and gone through, the May number of the *Tropical Agriculturist.* You have never been backward in giving *all* the news on planting topics, but still a stranger reading that number from cover to cover would not learn that there is a "Tea Crisis." The article on page 759 by a specialist touches lightly on the matter. Your specialist was not in favour of resting tea; he would advise estates to "abandon outright" any unprofitable area. This is a remedy for each estate, and not for the industry. On page 751 you have a letter to "Planting Opinion" from Mr. Ashton who decries the voluntary system of subscriptions and says that a Cess is necessary. Mr Ashton is the Chairman of the I T A., and this letter, "*ex-cathedra,*" gives his views. He points out the way to safety. He says that money is required and cannot be obtained by voluntary subscriptions. This letter was written in March; subsequent to that time the reduction scheme was adopted and dropped owing to the failure of Ceylon.*

On page 371 of "Indian Gardening and Planting" I have found a fresh scheme proposed by other members of the I T Association. They ask for

FREE GIFTS OF TEA.

This is in the face of the declaration by their Chairman that the voluntary business is a snare and delusion. The scheme proposed is one which is sure to succeed in its object, *i.e.* to make profits for the subscribers, but everyone knows that private sale of tea is certain to succeed, if undertaken on sufficiently large a scale—*vide* Lipton, Mazawatte, &c. But this will not help the industry. The dead silence which has succeeded the letter by Mr. Ashton has encouraged me to take up the cudgels and I am endeavouring to stir up all concerned; I have dreaded attacks on my "blooming cheek," but am ready to face anything. In his interview with "Tea" (the new paper), Mr. Rutherford said that there would have been no overproduction if India had had a Cess. This is a "tall" saying because after all India *did* subscribe a considerable sum, and the small difference between the amount subscribed and what would have been obtained from a cess at the *same rate* as Ceylon† would have made practically no difference in the great surplus which we failed to place on New Markets.—I am a plain, practical Planter like hundreds of others who toil, and have toiled, to make the industry what it is. We—I dare to speak for the rest—do not understand the cause of the failure to produce and adopt any scheme which shall at least give hopes

* Ceylon is practically carrying out the reduction through finer plucking.—ED. *T.A.*

† The difference for all the years the Cess has been levied in Ceylon would have been very considerable.—ED. *T.A.*

that prices will improve. How is it—we ask—that the only scheme which met with any pronounced favour—the reduction scheme—has been so universally condemned? We have absolutely come to the the end of our tether as regards quality. We car, and do, change the quality of our teas to meet the requirements of the markets, but we invariably make a thorough mess of it. The market howled for coarse tea and paid up to 6d. for it; with great joy, we responded. The extra duty was imposed, but tons of coarse tea were on the sea and in our tea houses—*it had to go on.*

Then came such foul abuse regarding quality that every decent manager began to blush, and it ended up by Mr. Skrine setting up a cry of "stinking fish." He got a special man to find microbes on *dry* tea. The tea they got hold of was dry, yet rotten. May the Lord help us and give us peace because, as the sentence goes, "there is none other to fight for us." I am speaking out on behalf of tea managers, myself included.

I have done all that *can* be done. I have reduced my expenditure, and forfeited the greater part of my commission. If this state of affairs lasts much longer, the quality of my tea must suffer. I shall have to reduce rolling, and fuel, and labour in the tea house. My garden receives the minimum of cultivation, and will have to do with less. I shall soon have to reduce my own pay, or look for fresh work.

None of this is *my* fault, (I speak for hundreds of managers); the fault lies with *you*, (*the owners*). I tell you out straight that, unless you get a Cess, and a heavy Cess, your properties will be closed. Some of you, like Mr Rutherford, own properties that may weather *any* storm. Will you refuse help to us who have been less fortunate. Some of you have helped in the past, and are willing to help in the future, but naturally you do not move heaven and earth for redress. When it comes to the vote will you help us?

There is room for all, and for double our present area of tea. If Ceylon and India will combine and have a Cess worthy of the Industry we shall be able to conquer the Tea world.

If Ceylon will let good Indian tea in free of duty, she would be able to blend her poor teas and make them valuable.

COLOMBO SHOULD BE OUR DISTRIBUTING CENTRE FOR AMERICA AND AUSTRALIA AND RUSSIA IN EUROPE.

If it comes to a fight, India is *much* stronger than Ceylon. We shall be able, by means of cheaper labour, and bigger ventures, to crowd you out. You supply 37 per cent to our 53 per cent to British consumption. We shall be able to run you down—down—down as we did China, by being more capable of expansion than you are. It will be a dreadful fight, but we are bound to win. "We don't want to fight but by jingo if we do!" &c. &c. Again I appeal as a manager—to the owners; why cannot you agree? and pull together, and make our work *certain?*

Up to now, you—the owners directors, agents, of tea properties—have pocketed the proceeds. It is time now to think, and to think seriously; to formulate some plan and *stick to it.* In the past your managers have pulled you through each crisis as it came up. I have recently learnt the reason why we cannot help you any more. It is because there is only seven million pounds of China tea to be displaced in British markets. We can no more prevent our expansion than can the school-boy. We stick out at each end and our chests are cramped by our clothes. You have to get us a new suit, and if you imagine that a new suit costing seven lakhs of rupees will cover our partial nudity you are mistaken. But it will relieve the pressure on the chest and let us breathe. I beg to be excused if I am too outspoken, or frivolous, or for any other fault. I understand that there is a crisis, a bitter fight for existence. I cannot understand this lethargy, this utter apathy, this heathenish way of sitting down to meet our fate.

We, the managers, have *trusted* the owners to find a solution of the difficulty. If they will not or cannot find it, we shall be better employed in serving men who *can* manage their business. If another war was to the fore, I believe that we could organize a managers' strike, and take the best brains out of the country. At present men are *waiting*; some of them will lose their reason from the strain, many their lives, and more their employment; a large proportion of owners and shareholders will lose their properties. A few will gain in the end, and tea will become an industry of bloated properties and trusts. Am I placing more than the truth before you? If so, the papers lie. I glean my forebodings from them. Have I exceeded my station by an inch? If so, it is for the benefit of my fellow-managers. We, the managers, cannot "strike," but let us speak out, and blow the consequences; nothing worse can happen than what we *have* to face in 1901, if our owners are asleep.

A. C.

COFFEE IN COSTA RICA.

(*From an ex-Ceylon resident.*)

Costa Rica, April, 1901.

Coffee planting and curing are carried on in this country in ways and under conditions peculiar to it. The only one which resembles it in some respects is the sister republic, San Salvador, as regards the size of the farms, and their being owned principally by native farmers who with few exceptions do all the manual labor necessary on their own lands, besides going out to look for work on larger estates when not too far off. The farmer sells his crop to different curing stations, and between these a lively competition has at all times existed, thus securing to the producer a lion's share of the profits, which would be much greater if he were to undertake to increase the productiveness of his land by an effective system of manuring, which alas is almost unheard-of, and cannot be hoped for. The present generation shut their eyes and ears to the most convincing of practical proofs. By this it can be inferred that coffee culture in general is not in a prosperous condition as regards crops produced, or prices of the same; the world's markets naturally being the cause of the drop in these of late years. With some exceptions, in the neighbourhood of the cities, the land under cultivation is owned by the small farmer who plants his coffee in lots which range from one acre upwards, and cultivates it in a manner which can well be termed orthodox, his principal implement being the broad shovel, in the handling of which he is an adept, so much so that no imported labour is employed to any extent, as all trials in this direction have resulted in failures. The cost of keeping up a manzana ($1\frac{3}{4}$ acre) is between 30 and 40 colones per annum and means four cleanings a

year in most cases, the colon being worth 46½ cents American gold; this means to larger estates where a day's work is the way labor is employed and paid for. In the centre of the republic native labor is scarce only at certain times—in June when the maize-fields have to be cleaned, and in October when summer beans are planted,—the labourer prefers to work in these districts for less wages than are paid on banana farms or in districts nearer the coast line.

MANURING AND PRUNING UNKNOWN.

As manuring may be considered almost an unknown feature, the same is true of trimming or pruning, it being almost impossible to follow the native farmer when at this kind of work, and establish a fixed idea, the tree in most parts being *shuck*, which becomes more scraggy in appearance as each succeeding crop is taken from it. There are ideas prevalent that the introduction of plantains and different kinds of shade trees are of benefit to the plantation, the first being an article of food, and therefore the origin of the idea; the latter, though planted with the object of giving shade to the coffee, is useful principally as a wind-break, during the dry months from Dec. to April, when the northerly winds are most violent, and also for firewood in some cases. Both however have their disadvantages, as at all times the plantain needs constant care to see that the stalks do not fall on the coffee, to say nothing of their being exhaustive of the fertility of the soil; while the cutting of firewood is also attended with damage to the coffee tree.

One crop of coffee is hardly picked and sold, before the farmer begins to think of

RAISING A LOAN

on the coming one, and has immediate recourse to some curing station, where it has long been the custom to make these advances for the purpose of securing as much as possible of the crops. This transaction, barring some risk, gives most of its advantages to the money-lender whose rate of interest is often 1½ per cent a month, sometimes more; capital and interest payable in coffee of stipulated good quality in fruit at current prices, the failure to deliver this incurs an additional fine of 20 per cent or more in case cash is taken instead of coffee; a backer's signature and pledge is exacted in all cases. This borrowing in advance has sent many a poor farmer to the wall, legal prosecution often following the non-fulfilment of such agreements.

Perhaps the most onerous of burdens laid on the farmer is the government

EXPORT TAX

which is levied when the coffee is shipped out of the country; it amounts to about one cent American gold per pound which means a considerable fraction of its value as prices are at present. No complaints are heard of, however on this point from the farmer, as it does not come from his pocket direct, but is paid by the exporter on whom he lays the blame of all reductions in his selling price. The daily papers often publish inflammatory articles in the same strain. When coffee begins to ripen, everybody is on the alert in ascertaining prices paid in the neighbouring stations, to make sure of not having to sell at a lower price than is possible, and soon afterwards men, women and children are out with baskets and cloths, some picking from higher branches, others from lower branches and what is on the ground, and everything is delivered to the stations all of a rush, which puts some of the receivers into a squeeze to know how they can take care of it all. Picking is done in December on the lower levels of 2,500 and 3,000 on the Pacific slope, and in January on the upper levels of about 4,000 feet elevation.

The disheartening effects of

THE FALL IN PRICES

of coffee are felt alike by farmers and purchasers, many manzanas being abandoned of late years, on account of low prices and small crops; the first is unavoidable; the second, however, seems to have found a remedy in what few farms have practised,—chemical manuring. Coffee manured thus by a brand of manure well, known in the London market yields 30 fanegas to the manzana, of high quality (the fanega, equal to 4 hectolitres giving 116 lb. of cleaned coffee), leaving clear profit of 300 colones upwards to the manzana. Taking coffee at its current price, as delivered in fruit, this cannot be called a low return, and is only an exceptional case on account of the use of manure. This being so, many owners of coffee estates near the capital have realised similar returns from land that was supposed to be exhausted long ago. The introduction of manures into the country is free of duty, and obtains also 33 per cent reduction in railroad freight. What is wanted, as Professor Voorhees expresses himself in the preface to his "First Principles of Agriculture," is the teaching of the use of manures in public schools according to practice and theory: every inhabitant of the country could have a manzana of his own whose yield would not alter the markets of the world one single point. As it is, the farmer in despair has abandoned some or all of his coffee, and has devoted himself to sugar-cane and yucca, the produce of which has to be sold in the Republic, both of them following the downward drop in prices. Indeed, some are at their wits' end to know what to plant, and talk about leaving off pants and taking to long shirts like the aborigines. In the interior of the country coffee may be said to be the only exportable product, and this is the part of the country where the farmer will always live if he can.

When coffee was at a good price, four and five years ago, several large lots of land were taken up on the Atlantic slope close to the railroad by capitalised firms, principally in the Turrialba and Juan Ninas districts: at elevations of 2,500 and 3000 feet. The climate, one of almost continuously daily rainfall all the year round, is not favourable to the development of a single uniform crop, as on the Pacific slope, but has to be picked two or three times a year. The price of labour is here fifty per cent and seventy-five per cent higher also; and last, but not least, the quality of the produce after a few crops does not fetch such good prices as at the start, blights in the crops being often heard of.

[There is no hope for coffee, we fear, until Brazil abates her enormous crops, larger this year than ever before. But has our correspondent never seen "cacao" in Costa Rica? It is said to be the home of certain kinds and that the people cannot grow enough for local consumption, so keen is the demand in the towns. That then (*Theobroma Cacao*—the cocoa or "chocolate" plant) ought to be a profitable product in rich soil, though it cannot stand wind.—Ed. *T.A.*]

THE "MASHEER" IN NORTHERN INDIA.

Local fishermen have heard of the Mahseer, if they have not all seen it; and although there have been many proposals in the past to introduce the fish into our streams from India, we do not think that any have been successfully carried out. It may interest members of our Fishing Club and other sportsmen, however, to learn that sportsmen in Northern India have been obliged to take steps to protect the Mahseer from extinction in the rivers of the Punjab, where they have been systematically netted for years at all seasons, with disastrous effects on the supply. The Giri river is nominally preserved by the Sirmoor Fishing Club; and as the income of the Club had for several years fallen short of the expenditure—probably through the forgetfulness which obtains here, too, on the part of many members to pay their subscriptions,—the Committee resorted to the extraordinary expedient of letting portions of the river to netting contractors! As was to be expected, the contractors went beyond the contract, and outsiders joined in the game, until the river was almost depleted. Netting has now been prohibited, the Club has improved its financial position, and the Sirmoor State, to which the Club pays heavy rental, has been asked to lend a helping hand to stop poaching.

The river Poonch, which once had a large stock of the largest Mahseer in India, is in a worse state; and there, writes an Indian contemporary:—

"For the past two years a contractor has come from Jhelum, armed with a permit signed by some local official in the Jammu State, and has proceeded to net the whole of the pools and runs between Tangrot and Nar, a portion of the river in which nine-tenths of the mahseer in the Poonch hibernate. With the last closing showers of the monsoon the fish drop down from the upper waters, and the long reaches below Nar, the Pota pools, the famous water below the fantastic cliffs of Palak, and, above all, the Jungoo pool close to Tangrot, are their refuges. In the cold weather the Jungoo pool presents a wonderful spectacle, being filled with thousands of huge masheer in a semi-comatose state, packed as close as sardines. They begin to assemble in September, and by the end of October the pool is full. Late in February, or more usually about the middle of March, the first slight spates come down the Poonch, and this is the signal for the mahseer at Jungoo to begin to work upwards. The same state of things holds good in the other pools of the lower portion of the Poonch. When, therefore, a band of men armed with nets, and with unlimited time at their disposal, proceed to clean out pool after pool, sparing nothing, it is easy to conjecture the enormous damage done to the river. During the summer time the large mahseer would probably succeed in breaking all ordinary nets; but in the winter they are overtaken by a strange species of lethargy, and lie for days together at the bottom of the pools without moving."

The Mahseer weighs up to 50 lb and affords excellent sport, and we can sympathise with those who complain of operations which sweep one pool after another of all fish. No less than 200 maunds of Mahseer are said to have been taken by nets out of two pools last winter. The local Government should help our sportsmen to establish the Mahseer in some of our Ceylon rivers?

"MATÉ" TEA.

(From the Encyclopædia Britanica.)

Maté, or Paraguay Tea, consists of the dried leaves of *Ilex paraguayensis*, St Hil.,* an evergreen shrub or small tree belonging to the same natural order as the common holly, a plant to which it bears some resemblance in size and habit. The leaves are from 6 to 8 inches long, short-stalked, oblong, wedge shaped, rounded at upper end, and finely toothed at the margin. The small white flowers grow in forked clusters in the axils of the leaves; the sepals, petals, and stamens are four in number; and the berry is 4-seeded. The plant grows abundantly in Paraguay, Corrientes, Chaco, and the South of Brazil, forming woods called *yerbales*. One of the principal centres of the maté industry is the Villa Real, a small town above Asuncion on the Paraguay river; another in the Villa de San Xavier, in the district between the rivers Uruguay and Parana.

Although maté appears to have been used from time immemorial by the Indians, the Jesuits were the first to attempt its cultivation This was commenced at their branch missions in Paraguay and the province of Rio Grande de Sau Pedro, where some plantations still exist and furnish the best tea that is made. From this circumstance the names Jesuits' tea, tea of the Missions, St Bartholomew's tea, &c., are sometimes applied to maté. Under cultivation the quality of the tea improves, but the plant remains a small shrub with numerous stems, instead of forming, as in the wild state, a tree with a rounded head. From cultivated plants the leaves are gathered every two or three years, that interval being necessary for restoration to vigorous growth. The collection of maté is, however, chiefly effected by Indians employed for that purpose by merchants, who pay a money consideration to Government for the privilege.

When a yerbal or maté wood is found, the Indians, who usually travel in companies of about twenty-five in number, build wigwams and settle down to the work for about six months. Their first operation is to prepare an open space, called a *tatacua*, about 6 feet square, in which the suface of the soil is beaten hard and smooth with mallets. The leafy branches of the maté are then cut down and placed on the tatacua, where they undergo a preliminary roasting from a fire kindled around it. An arch of poles, or of hurdles, is then erected above it, on which the maté is placed, a fire being lighted underneath. This part of the process demands some care, since by it the leaves have to be rendered brittle enough to be easily pulverised, and the aroma has to be developed, the necessary amount of heat being only learned by experience. After

* Mr J Miers has proved that *I cuitibensis, I gigantea, I ovalifolia I Humboldtiana*, and *I nigropunctata*, besides several varieties of these species, are in general use for preparing mate.

drying, the leaves are reduced to coarse powder in mortars formed of pits in the earth well rammed. Maté so prepared is called *caa gazu* or *yerva do polos*, and is chiefly used in Brazil. In Paraguay and the province of Parana in the Argentine Republic the leaves are deprived of the midrib before roasting ; this called *caa miri*. A very superior quality, or *caa cuys*, is also prepared in Paraguay from the scarcely expanded buds. More recently a different method of drying maté has been adopted, the leaves being heated in large cast-iron pans set in brickwork, in the same way that tea is dried in China ; it is afterwards powdered by machinery.

The different methods of preparation influence to a certain extent the value of the product, the maté prepared in Paraguay being considered the best, that of Oran and Paranagua very inferior. The leaves when dried are packed tightly in serons or oblong packages made of raw hides, which are then carefully sewed up. These shrink by exposure to the sun, and in a couple of days form compact parcels each containing about 200 lb of tea ; in this form it keeps well. The tea is generally prepared for use in a small silver-mounted calabash, made of the fruit of *Crescentia Curete* (Cuca) or of *Cucurbita lagenaria* Cabaco), usually about the size of a large orange, the tapering end of the latter serving for a handle In the top of the calabash, or *maté*,* a circular hole about the size of a florin is made, and through this opening the tea is sucked by means of a bombilla. This instrument consists of a small tube 6 or 7 inches long, formed either of metal or reed, which has at one end a bulb made either of extremely fine basket-work or of metal perforated with minute holes, so as to prevent the particles of the tea leaves from being drawn up into the mouth. Some sugar and a little hot water are first placed in the gourd, the yerva is then added, and finally the vessel is filled to the brim with boiled water, or milk previously heated by a spirit lamp. A little burnt sugar or lemon juice is sometimes added instead of milk. The beverage is then handed round to the company, each person being furnished with a bombilla. The leaves will bear steeping about three times. The infusion, if not drunk soon after it is made, rapidly turns black. Persons who are fond of maté drink it before every meal, and consume about 1 oz. of the leaves per day. In the neighbourhood of Parana it is prepared and drunk like Chinese tea. Maté is generally considered disagreeable by those unaccustomed to it, having a somewhat bitter taste ; moreover, it is the custom to drink it so hot as to be unpleasant. But in the south-eastern republics it is a much-prized article of luxury, and is the first thing offered to visitors. The *gaucho* of the plains will travel on horseback for weeks, asking no better fare than dried beef washed down with copious draughts of maté, and for it he will forego any other luxury, such as sugar, rice, or biscuit. Maté acts as a restorative after great fatigue in the same manner as tea. Since it does not lose its flavour so quickly as tea by exposure to the air and damp, it is more valuable to travellers.

* The word *caa* signified the plant in the native Indian language. The Spaniards gave it a similar name, *yerba*. *Mate* comes from the language of the Incas, and originally means a calabash. The Paraguay tea was called at first *yerva de mate*, and then, the *yerva* being dropped, the name *mate* came to signify the same thing.

Some writers attribute deleterious effects to its use, while others praise it to an almost incredible degree. Its physiological action does not appear to have been carefully worked out, but its extensive use in countries where tea and coffee are known seems to indicate that it may possess virtues peculiar to itself.

Its properties appear to be chiefly due to theine or caffeine. Analysed by Dr H Byasson, 100 grains were found to yield.

	Grains.
Caffeine	1·850
Glutinous substance or peculiar fatty matter and colouring matter ...	3·870
Complex glucoside	2·380
Resin	0·630
Inorganic salts, including iron ...	3·920
Malic acid not estimated.	

According to analyses made by Alonzo Robbins it also contains about 1·5 of a peculiar tannin which does not precipitate potassiotartrate of antimony, nor tan leather. The glutinous substance resembles in consistence common birdlime, and is considered by Byasson to be a compound ether, the alcohol of which would be near cholesterin. Since the beginning of the 17th century maté has been drunk by all classes in Paraguay, and it is now used throughout Brazil and the neighbouring countries. In 1855 the amount of maté annually consumed in South America was estimated by Von Bibra at 15,000,000 lb, and the consumption is now probably three or four times as great; in Brazil it brings in a revenue of about £410,000. In the Argentine Republic alone the consumption is not less than 27,000,000 lb per annum, or about 13 lb per head, while the proportion of tea and coffee consumed is only about 2 lb of the former and ¼ lb of the latter per head. The export of maté from Brazil to foreign countries has also increased from 2,720,475 kilos in 1840 to 5,206,485 kilos in 1850, 6,808,056 kilos in 1860, 9.507,086 kilos in 1870, and 14,063,731 kilos in 1879–80.

TEA SEED OIL.

We are much indebted to Mr. Collett for his opportune letter on the subject of tea seed oil. We had rather more than a little doubt as to the prospect of its proving a more paying product than tea in even a few cases ; but Mr. Collett finds from practical experience that not only is it not advisable to change non-paying tea-fields into seed-bearing plots for the purpose of oil production, but that even the plucking of the seed and production of oil from *abandoned* fields will not yield a profitable return. It will, in view of these results in Ceylon, much surprise us if Mr. Drummond Deane obtains satisfactory returns and we await the news of how his forthcoming shipment of tea-seed oil is received, with considerable interest. The *Encyclopædia Britannica* speaks of the oil as follows :—

Tea-seed oil is a commercial product in China, where it is used for food, lighting, and soap-making. It is said to yield a fine hard soap. The oil contains 75 per cent. of olein and 25 parts of stearin, has a yellow colour, and is destitute of taste and smell.

PRODUCE, PLANTING AND COMMERCIAL NOTES.

An endeavour is being made in the United States by firms prominently identified with the Japanese tea trade to form a big combination in order to control the market. We learn from one American journal that the object is to "do away with the ruinous competition which the trade has recently been undergoing, which has placed Japan tea at a distinct disadvantage with the China and other teas which are fired and packed by natives." We like the term "other teas"; perhaps the firms who wish to establish a Japanese tea trust are sensitive on the subject of Indian and Ceylon tea in general and the green tea movement in particular.

The following letter from Mr P C Larkin, of Toronto, written to Mr Mackenzie, on reading in our columns the report of the Ceylon Commissioner on the American tea market, is of interest. He says:—"I have read with a great deal of interest your letter in the *Home & Colonial Mail* of May 17th. Mr Drummond, of the Anglo-American Direct Tea Trading Company, Limited, was good enough to bring it over to me. With regard to the figures which you gave as being the quantity of greens we take per month from Whittall and Co., you could have increased these one-fifth, as they ship us every month at least 24,000 lb. of Ceylon green tea. In addition to their shipments, we have bought many hundreds of chests from Odell, Crosfield and Lampard, and others. You know what I have been predicting for the last eighteen months; that is, that these Ceylon greens will entirely displace Japans in America. This is surely coming to pass. It may take twenty-five years or five years, just as the planters wish. If the Indian planter would do just as I, and dozens of other advertisers, do, viz., advertise, advertise, advertise, it would bring about the desired state of affairs in a very short time. If they don't advertise it will take them a mighty long time, however superior their goods may be in quality. I have shown you an instance up in North Bay. There is a firm up there who, under great persuasion, took a few pounds of Ceylon green tea with their black tea order. We got a list of names of Japan tea drinking customers, and sent out sample lead packets to them. This brought about sales, and made them fairly enthusiastic about our Ceylon greens, as they had been about our "Salada" blacks for some years. They said they could sell very large quantities of the greens, and displace Japans with them, if we would do something towards advertising. Well, I've shown you what we did. We subsidised them to advertise in their local paper, and you have seen the full pages and half-pages they have taken at different times to advertise our Ceylon greens. What has been the consequence? They have had three 500 lb. orders, the originals of which have all been sent on to you. Now that is only one very, very small point in our whole territory; and we cannot afford to subsidise all over, as you know; but it should be done by the Ceylon and Indian planters from one end of America to the other. There is a whole district around about North Bay now where the people are interested in Ceylon green tea, and who are drinking it; and Japan teas there have been displaced. It was experimental on our part, the subsidising of this firm, and we have shown you the results. It may be said that the planters cannot afford to advertise. Neither can I afford to do so, but I can still afford less to drivel. I note some remarks in your letter about 40,000·00 dols or 50,000·00 dols per year. It is not forty or fifty thousand dollars per year you want to exploit the United States and Canada properly, but six times forty or fifty thousand dollars, so that every newspaper will be full of Ceylon and Indian Tea, samples will abound, and so that the matter will be forced upon the attention of the whole people of the country in a very short period. This would bring about such a relief to the London market that teas would be a penny per pound higher than they otherwise would be. I am awfully glad that you look favourably on my suggestion of Ceylon teas of Oolong flavour. If this can be done it will be making our path still easier, and when they have succeeded in making such admirable greens I fancy they can produce anything in the tea line. If we had had greens in Canada here nine years ago, when I took up blacks, what an easy path we would have had, compared with what we have experienced. The same may be said of the last four or five years in the United States. Our sales there would have been at least double what they are now. A drinker of Oolong is just as much wedded to his peculiar kind of tea as a drinker of Japan is to his kind, or as a drinker of black is to his, and they can only be weaned away from their kinds by the greatest efforts, and it requires but one-fiftieth of the efforts to produce results when you are offering them a tea of a similar flavour and kind."

Last week we quoted some comments from the *Globe*, referring to Indian and Ceylon tea companies. These comments have called forth the following reply from Mr. George Seton, who, writing to the *Globe*, says: "A paragraph in your issue of the 28th instant with reference to Indian and Ceylon tea companies seems likely to lead to misapprehension. Owing to excessive extensions of the plantations during the good times, and to consequent over-production, tea prices have dropped very low, and results to tea companies last year are poorer than previously. Estates producing high-class tea, and those with a low cost of production, have done pretty well; but those with a weak financial position, or whose expenses of administration were high, have done poorly. The home market is at present over-supplied with tea, but foreign and colonial markets are every year taking off increasing quantities, and this was especially the case last year. British investors who purchased shares at top prices are no doubt disappointed, but up to 1898 they received good dividends, and they will doubtless do so again. Dividends, recently announced for 1900, have ranged from 15 per cent. down to nil. Share capital of 45 representative companies, whose market value rose in 1897 to 12½ millions sterling, has now dropped to little over seven millions! An endeavour has been made to collectively restrict production, but it has been found impossible to form a combination, as has been done in the nitrate-producing trade. Restriction of output, however, is being largely adopted by the leading companies, and all extensions, it is believed, have been stopped. Under these circumstances, then, the trade is likely, eventually, to recover its prosperous condition."

DISEASE IN PLANTS.

When a doctor is summoned to the bed-side of a patient, he listens attentively to the narrative given by the sick man or his friends, forming meanwhile his own general impressions from the aspect of the patient, and from what he sees and hears. These preliminary proceedings are generally quite inadequate, and, so far as the account and especially the theories framed by the patient are concerned, almost always misleading if not wholly incorrect. Having gained as much information as possible in this way, and having made the necessary allowances, the doctor proceeds to investigate "the case" for himself. He learns all he can about the family history, mode of life, and "constitution" of his patient; what previous illness he may have suffered from; when, and in what manner the present sickness began, and what has been its progress. Having thus obtained a general knowledge of the state of affairs, the doctor proceeds to investigate, in due and regular sequence, the condition and working of the several organs of the body. And not till he has made this through investigation of "signs" that he sees and can personally detect, and of "symtoms" that are made known to him by the patient, does he venture on either diagnosis, or prognosis; still less, unless he be a quack, on methods of treatment.

Nether the patient nor his friends desire, or could in most cases appreciate, the inductions that the doctor makes. They wish to know, in general terms only, what is the matter, what are the prospects of recovery, and what are the measures to be taken to secure that end.

Plant doctors up to this time have been too communicative, and not sufficiently practical. If they see a fungus they forthwith measure its spores in fractions of a millimetre, they compare it with other organisms of a similar nature, and they draw up a highly technical description, which is quite unintelligible and equally useless to the persons for whose benefit it is supposed to be framed. Now, we are far from wishing to depreciate these proceedings. For purposes of scientific research they are absolutely essential. It is likewise essential that the fungi be cultivated by the plant doctor, and their life-history accurately studied, as upon the information so obtained depend in most cases our methods of combating disease or preventing its onset. This cultivation takes time, and hence it is not always possible to give an immediate or even a speedy answer to enquirers. But the details to which we have alluded are appropriate only to the student. The busy cultivator has not the time nor the means to make the necessary investigations. He wants general results, and specially indications for treatment.

Many, perhaps we may say most, treatises and papers hitherto written have been drawn up by experts, with too little attention to the requirements of cultivators. A book now before us proceeds to a large extent on different lines.* The very title, "Disease *in* Plants" (the italics are ours), indicates this. No one is more competent to compile such a book as this than Prof. Marshall Ward. The work is apparently based on a series of lectures, though we are not expressly told so; nevertheless, the following passage shows the intention of the writer:—"The purpose of these essays is to treat the subject of disease in plants with special reference to the patient itself, and to describe the symptoms [signs] it exhibits and the course of the malady, with only such references to the agents which induce or cause disease as are necessary to an intelligent understanding of the subject, and of the kind of treatment called for." The first part is devoted to an admirably clear and concise account of the living plant and what it does, to the biology of the soil—a comparatively new but most important subject, and to a short account of hybridisation and selection.

Part II. is devoted to diseases in plants, their causes, nature, diffusion, and the remedial measures to be adopted. Sundry chapters are given to "symptoms" of disease, which in medical phraseology should be "signs," and these should be attentively read by cultivators. The inclusion of scale-insects among symptoms seems rather incongruous, but this is a matter of little moment. "Silver leaf" disease, characterised by the detachment of the epidermis from the subjacent tissues is, in our experience, confined to members of the Rosaceæ, and is as common out-of-doors as under glass, so that we do not think it has any special connection with hot summers. Not only are plants considered in their medical aspects, but their surgical injuries are also discussed, such as wounds of various kinds, including the burrowing excavations made by certain insects in leaf or branch. Among excresoences we do not find mention made of the warts on the under surface of Vine-leaves, which are so common in vineries where the proper balance between temperature, moisture, and ventilation is not maintained. Under "Gummosis," we do not find any reference to Beijerinck's observations on Coryneum.

The chapter on Life and Death is full of suggestive matter; the more so, as we know of but one book intended for the use of cultivators that deals with this subject, and in that only in a much less complete manner than in Prof. Ward's book.

The book has copious references to the literature of the subject, but these are not always sufficiently explicit; for instance, to cite the *Gardeners' Chronicle* without specifying the date of publication and page, is simply to embarass the enquirer. The author has evidently been hampered by his desire to keep the book within convenient limits, a circumstance which has led to undue concision; but, on the whole, we have nothing but praise to bestow upon a book which will be so useful to the intelligent cultivator that no garden library should be without it.—*Gardeners' Chronicle*, May 18.

* *Disease in Plants.* By H. Marshall Ward, Sc. D. (Macmillan & Co.)

MOSQUITOS AND EUCALYPTUS.

The *British Medical Journal* doubts the wisdom of the proposal by the Sanitary Department of Havana to plant eucalyptus trees in all the marshy and malarial districts in and around Havana as a mosquito deterrent. The journal in question points out that in a paper by Prof. Celli, which appeared in the *Journal of the Sanitary Institute* for January, that distinguished authority says that the eucalyptus, so far from being protection, is, like other trees, rather a shelter for mosquitos, and in the neighbourhood of dwelling-houses adds to the danger of malarial infection.—*Globe*, June 7.

CEYLON *VERSUS* BAVARIAN GRAPHITE.

This mineral, which is now much in request as a lubricator of machinery, is one of the most valuable products of Bavaria, the only formidable competitor in the supply of natural graphite being Ceylon. The production of graphite in Ceylon has, however, dimininished, causing a great rise in prices, as the deficit could not be made good from other sources. The Bavarian graphite is inferior to the Ceylon product, as, while the latter is nearly pure, the former has about sixty to seventy-five per cent. of earthy substances mixed with it. With Bavarian methods, it is stated, there is a great waste of raw material, and it is alleged that nearly ninety per cent of the mineral is absolutely thrown away, owing to the short-sighted and unscientific system of working.—*United States Consular Report*.

AGRICULTURAL EDUCATION IN CEYLON.

(Extract from Report of Director of Public Instruction for 1900.)

SCHOOL GARDENS AND ELEMENTARY HORTICULTURE.

An order was issued several years ago that every Government school was to have a garden, but nothing was done to introduce method into the general scheme, and, although a few of the most intelligent schoolmasters set to work on practical lines, in the large majority of cases the effort stopped short at a few unsuccessful crotons. The scheme now gradually being developed is (1) to select in each Province those schools where, owing to climatic circumstances and space, a garden can be profitably developed and to let the other schools alone for the present, (2) to keep two objects in view, the picturesque and the utilitarian: to cultivate the ideas of taste, neatness, pleasant surroundings on the one hand, and on the other, in consultation with the revenue officer and headmen, to discover what economic products do best in or ought to be introduced into the neighbourhood, and to devote a large section of the garden to these, (3) to start supply gardens at various centres for the issue of seeds, cuttings, &c., (4) to appoint a special Inspector of Gardens who will take charge of the supply gardens, visit all the selected school gardens in turn, instruct the teachers how to instruct the pupils and what points to pay special attention to, and give a few elementary lessons in school on practical horticulture and botany. The Director of the Royal Botanic Gardens has given the scheme his warm support and his advice has been closely followed. The matter is one of great and growing importance. Whatever may be argued as to teaching the natives agriculture, there can be little doubt that in horticulture (especially as concerns manure, rotation, new products, &c.), there is a great deal they can be profitably taught if the education is practical and the scheme removes from our State educational system one of the chief reproaches levelled against it,—that it is mere book-learning and of no practical utility.

SCHOOL OF AGRICULTURE: BY MR. C. DRIEBERG.

The number of students on the roll was, as in the past few years, kept low by the continued uncertainty as to the future of the institution, and the persistent rumours of its impending abolition. For the year under review it was 16, made up of 6 seniors and 10 juniors. On the results of the final examination held in November, two students became entitled to first-class certificates granted by the Department of Public Instruction, and one to a second class certificate. M.D.S.A. Wijeyenayaka and E. Jayatillake, old boys of the school, have been appointed stock inspectors.

Another Commission, distinct from that referred to in my last report, was appointed to deal specially with the question of the continuance of the school.

The recommendation of this Commission was to the effect that the School of Agriculture, as at present constituted, should be closed at the earliest opportunity; this will probably be on the 31st March, the end of the first school term of the year.

A scheme for establishing an experimental garden, and, possibly, scientific agricultural classes, in connection with the Royal Botanic Gardens (the staff of which has been augmented by the appointment of a number of scientific experts), and another distinct scheme for agricultural instruction through the children of village schools, by means of nature study lessons and school gardens, are under consideration. The developments under either scheme will be for further reports to deal with.

The experiment in bee-keeping continues, as must needs be with a pioneer industry, slowly, but with it a knowledge of the habits and instincts of our Ceylon bees is gradually acquired.

The school premises became the headquarters of the Paris Exhibition Committee's operations. I myself was connected with the Committee as Assistant to the Secretary-General (afterwards Delegate for the Ceylon Government at Paris). The work of organization, and particularly the collection and classification of the vegetable products of the island, proved of special interest, and served as a useful medium of instruction to the students of the year, who themselves helped me a good deal.

The "Agricultural Magazine" completed half its 12th volume at the end of the year.

The rainfall registered at the school was as follows:—January 4·33, February 3·50, March 1·17, April 16·01, May 11·11, June 7·71, July 7·47, August 79·6, September 7·12, October 11·85, November 6·98, December 6·98. This makes a total of 91·02 inches for the year. For purposes of comparison I give the rainfall as recorded in the Fort, viz., 83·68.

Of the forty acres originally attached to the Dairy about six acres were put up for public sale by the Government Agent of the Western Province, and the land sold (about four acres) realized R8,000 per acre. The land is to be utilized for building purposes.

SCHOOL GARDENS, NATURE STUDY, AND AGRICULTURAL TEACHING.

By Mr. J. C. Willis.

The most practical means of influencing the agricultural practice of the country for the better, and of introducing new products and ideas, is by working through the children at school. I think a system of school gardens, supplied from the Royal Botanic Gardens with the best kinds of plants, cultivated by the teachers and students, and used as object lessons by the former, aided by leaflets issued by the staff of the gardens for their guidance, and, if it can be arranged later, by actual lessons given by the staff to teachers, offers fair prospects of success and usefulness.

The opening of these school gardens and their stocking with good fruit, vegetables, &c., is sure to lead to the gradual introduction of new cultivations into the villages, and the stocking of the gardens from the Royal Botanic Gardens will ensure that these new introductions are good of their kind. In so far as these cultivations are concerned, the school gardens may be used to give a certain definite amount of agricultural instruction, but in general they should never be regarded as organizations for the teaching of agriculture. The teachers are not themselves sufficiently qualified to teach agriculture or to criticise methods already in use in the villages. The aim of the gardens should rather be what is now called "Nature Study," the inculcation of habits of observation and induction among the pupils. Such training will render such pupils much more capable when older of appreciating definite agricultural instruction, and will render them able to criticise intelligently the methods they employ in the actual cultivations that they may carry on in after life. They may be taught the reasons why such or such an operation is performed, and performed in such or such a way, but they should never be given definite instruction in the cultivation of staple products; to do so will be fatal to the success of the scheme.

School gardens should cultivate ornamental as well as useful plants, and pupils should be encouraged to do the same. A few gardens should first be selected for trial; these might be visited by the officers of the Royal Botanic Gardens, and the general plan of laying out and gardening decided. The seeds and plants should be supplied from the Botanic Gardens, planted and attended to according to instructions by the school teachers and scholars. Object lessons should be given at occasional intervals, and experiments carried on upon lines to be indicated in leaflets previously issued, and the teachers should never try to give these lessons or try the experiments with the pupils till they themselves have previously mastered them.

The following titles are suggested for such leaflets:—

How a pumpkin plant gets out of the seed.	The soil.
Cuttings.	Seed travellers.
Children's gardens.	Why must plants be watered ?
Annual flowers.	The growth of a rice plant.
The planting of school grounds.	The flower, what it is.

Many interesting entomological subjects can also be used.

Only a few kinds of plants should be cultivated in any one garden, and new ones should only, as a rule, be distributed one kind at a time.

Children should be encouraged to grow plants at home, and new kinds be given to those who do well.

The work done should not be made the subject of examinations. Children should be encouraged to observe accurately, and to record in writing and with drawings what they observe.

A book should be kept at school in which the dates of planting and the subsequent history of all the important products may be recorded. Much valuable information about the districts, climates, and soils suitable for such products may thus be collected.

One-third of the produce of each garden should be the property of the teachers in charge, another third be given to the pupils, and the remainder, after deducting what is needed for seed in the following season, be the property of the Department of Public Instruction, for distribution to other schools. What is not wanted for this purpose should be returned to the Botanical Gardens.

TROUT, DEER, AND INDIAN ELK IN NEW ZEALAND.

There were liberated in rivers in the Wellington acclimatisation district this year 46,000 brown trout and 15,000 rainbow trout —a total of 61,000. There were 80,500 fry sold to other societies—29,000 brown, 39,000 rainbow, and 12,500 Loch Leven. The total quantity of ova collected by the curator of the Masterton ponds was 700,000. Of these 10,000 were from "fontinalis," 25,000 from Loch Leven, 65,000 from "rainbow," and 600,000 from brown trout.

Mr. Grogan, the African traveller, it was stated at the meeting of the Wellington Acclimatisation Society last night, is very much struck with the extent of waste country in New Zealand suitable for such animals as African deer, and as it is the intention of the society to import deer of this description, the council will probably interview Mr. Grogan on the subject when he returns to Wellington.

The annual report of the Wellington Acclimatisation Society states that sambur (or Indian elk) were liberated on Carnarvon estate many years ago. The herd is now reported to number about 100, but there is good reason to think that they are really more numerous. That they are slowly but surely distributing themselves over the country most suitable for them is evidenced by a report just received by the Auckland Acclimatisation Society to the effect that a pair of sambur antlers had been found on the hills near Cambridge, and that two sambur had been shot there. No sambur have been liberated in the North Island except at Carnarvon, and these deer must of necessity have travelled overland from there, a distance of about 200 miles. The four moose imported by the Government, and liberated near Hokitika, have been seen several times, and are reported to be looking well. The society's council contemplate importing some varieties of deer from South Africa, and hope to be able to get the Government to assist them in this venture.—*N. Z. Mail*, May 23.

PLANTING MANUALS AND OTHER LOCAL PUBLICATIONS.

Taking advantage of his freedom from the daily treadmill, Mr J Ferguson has been revising the manuals on "All about Spices" (Pepper, Cubebs, Nutmegs, Cloves, Ginger, Vanilla, Pimento and Cinnamon) and "All about Tobacco-growing and preparation"—both of which have been out of print for some time. He is also desirous of completing a Paper on the "Rise and Progress of Coconut Palm Cultivation in Ceylon,"—the material for which he has been collecting for a long time past. Any further information bearing on the above products or subjects from planters and others will be very welcome and may be addressed to "Naseby House, Nuwara Eliya."—The completion of a new edition of the popular Handbook to "Ceylon" (Ceylon in 1902) must come later. Copies of the recent editions of the Manuals on "Rubber and Gutta Percha" and on "Coconut Planting" are still available. The *Observer* Press is at present busy with reprints of two very useful little works, namely,—a new (the Fourth) edition of Dr. Vanderstraaten's well-known "Index of the Diseases of Children in Ceylon and their Treatment" with several additional Notes by the author; and also a Fourth Edition of "Cookery for Ceylon"—locally compiled, the recipes being given in Sinhalese and English, the *brochure* being dedicated to all housekeepers, cooks, &c—A new edition is also required of the handy pamphlet, published at the *Observer* Office, on "Gardening Vegetables, Flowers and Fruit in Ceylon" in the compilation of which the late Messrs. W Ferguson, F.L.S., and H Sims and Messrs. W Cameron and W Nock took a part. Due notice will be given of the completion of these works.

THE TEA TRADE.

MESSRS. THOMPSON'S ANNUAL REVIEW.

38, Mincing Lane, June, 1901.

In the statistical record of the twelve months, ending 31st May, which we print at foot, will be found much that is of interest, and even a little that is encouraging amidst the disappointments which so many have suffered.

The figures show the great producing powers of Indian and Ceylon plantations; unlooked for vitality in China's export trade; a larger volume of business than ever before, but——a decline in the average value of our product, so considerable as to seriously affect the welfare of nearly everyone connected with the Industry.

As a year ago, so now, the statistics relating to Home Consumption have been disturbed by the heavy clearances before the Budget, and do not enable us to gauge what increase there has been, if any. We incline to the opinion, however, that consumption is increasing, notwithstanding the raising of retail prices, necessitated by the advance in the duty. That the *proportion of British-grown tea* used has increased is certain.

But important as this would be if supply and demand were evenly balanced, it is of comparative insignificance at the present juncture, for production has outstripped the combined requirements of home and foreign markets, and a limit has been found, for the present, to the quantity that can be taken at prices that will pay the producer.

To this untoward fact the decline in value must be directly attributed. The fall would probably have taken place eighteen months ago, if it had not been for the heavy speculative transactions in anticipation of the Budget of 1900; it has been accentuated by the re-action which followed, by the strain upon the Traders' resources caused by the high duty, by the heavy and poor crop, and to some extent by the use of unsuitable chests.

An opinion is held by some that economy has perhaps been pushed further than is wise, but we do not propose to tread upon this debatable ground, or to dwell upon market fluctuations, exchange, the rainfall or the temperature, or to discuss those details of administration and manufacture which rightly occupy the attention of Managers—preferring to pass to the consideration of broader issues.

Stated in the fewest words these issues are—improvement of quality, restriction of quantity, consolidation of interests, the development of new markets, and the outlook for our home and export trade.

To revert to a higher standard of quality, where it is possible, appears to us of primary importance. The stocks held everywhere consisting of inferior tea, the turn for a finer crop has come; London and Provincial buyers ask for it and will handle it with more confidence, whereas they regard with foreboding the possibility of another large and common one. It is quite true that trade has been stimulated in the past by abundant and cheap supplies, but a low quotation alone, without merit in the tea itself, no longer brings new customers, and a larger business without profit benefits no one but the shipowner, the warehouse-keeper, and the Custom House.

We emphasise the need of listening to what the Home Trade say, because they are in touch with consumers; while taking, as they do, 80 per cent. of the total output of India and Ceylon they ultimately determine the value of the whole, wherever sold or however distributed.

Methodical and deliberate curtailment of quantity is of almost equal importance. An agreement between a large number of planters to effect it would have been a useful addition to the measures which others are going to take in their own interest; but the reasons of those who were unable to bind themselves in the manner suggested are quite intelligible, and after all, it might have failed of its purpose if it had led managers to regard it as the one panacea for all ills, and to relax their efforts to make better quality. Its failure, however, is an additional reason for those who know that they can make finer and more valuable tea to do so, and not be turned from their purpose if they hear that a shorter supply has improved the position of low-priced teas without benefiting fine—an eventuality for which they must be prepared. It may be that, if managers were not required to make estimates before the season has commenced, or at least if their estimates were not published, they would be less tempted to realise them at all costs, when, perhaps, they ought to be doing just the reverse.

The amalgamation of separate and sometimes of conflicting interests might make it easier to unite in pursuit of a common policy. The process is capable of development—not necessarily in the form of a Trust but preferably on the lines of some of the older associations under one strong central management and control which have proved successful in Ceylon and India. The risk being distributed in this way over wider areas, and between estates yielding both high-priced and low-priced tea, the investment of capital becomes more secure, financing is made easier, and the shareholder has a more liquid asset.

We pass on to consider the markets outside the United Kingdom open to us, and the best means of gaining entrance to them. The fact that of the tea used at home only 5 per cent. now comes from China shows how little margin there is for increased sale here of British-grown tea, and illustrates the importance of finding customers elsewhere.

Useful and even necessary as advertisement, subsidy, and the intelligent work of special agents have been in countries where our tea was practically unknown, we have now to rely upon business expanding through the regular channels of trade, to work upon a commercial basis, and to trust to our ability to sell cheaper and better tea than can be obtained from other sources.

There is not room for a much larger business with Australia, which already draws from Calcutta and Colombo 80 per cent. of its supply (leaving only some 6 or 7 million lb. of China tea to be displaced), and can obtain from those markets all it wants, as London buyers will probably be ordering less this year. Canada takes about 45 per cent, of its import from us, leaving some 13 or 14 millions of Japan and China tea to be displaced. The trade with Asia is becoming useful, as it takes tea of which there is sometimes an over-supply, thus relieving this market. Germany, South America, and South Africa are still small outlets though steadily growing.

There remain the great markets of Russia and the United States, using annually some 180 million lb. Of these, the Russian is the more hopeful, because it requires black tea, appreciates quality, and is taking more from us every year, by direct importation or from London; it, too, is calling for better tea. Our trade with America continues to disappoint some who had not grasped the difficulty of persuading people who prefer tea uncoloured or green to drink our strong black sorts. The attempt to manufacture tea to suit their tastes is enterprising, but we fear lest it be made in a way which will give trouble and bring disappointment to a number of individual growers, without substantial benefit to anyone. It will take a decade to create a trade worth anything to us by means of specimens unlike in make or flavour; for large distributors hesitate to introduce a new kind of tea to their customers unless they can rely upon a regular, uniform and free supply. We think if Americans had this matter in hand on their own account they would rent for a term of years estates capable of producing, at the lowest possible cost, millions of pounds per annum, have it all made uniformly into two or three grades, procure men and materials from China for packing it in the way Americans like, give a constant supply, and undersell their rivals until the trade was made. It would cost money, but it might prove the cheapest and most effectual way of making a market—assuming, of course, that we can make unfermented tea that Americans will drink. Seeing that we have obtained less than 10 per cent of a trade amounting to 84 million lb. per annum, after twenty years of heavy expenditure by planters and strenuous effort by the agents of London Dealers, it is obvious that other means must be tried. It has been said that tea is not likely to become in America the popular beverage that it is here and in the Colonies; but it may be that the small and declining consumption in the United States—now only $1\frac{1}{3}$ lb. per head per annum—is due to the astringent and unsatisfying nature of the Japan and China teas principally used, as compared with the softer and richer teas of India and Ceylon which other races of Anglo-Saxon origin find such a cheap and wholesome article of diet that their annual consumption has reached the rate of nearly 6 lb. per head. It should be noted how largely the use of tea here has increased since the introduction of our own in place of Chinese growths.

As regards the Home Trade—which is the most important factor, inasmuch as our 42 millions of people, taking their 250 million lb. per annum, use nearly as

much as the rest of the world put together—its position is financially sound. The tendency continues for business to come into the hands of the large specialists, whether Dealers, Blenders, or Distributors, who, by absorption or purchase, seem to be getting the trade under their control at the expense of the smaller vendors. If this entails risk of possible combination of buyers against sellers, it finds some compensation in the larger financial resources they command and their greater power of holding stocks.

It is of importance to growers that those who buy and pay for their produce should be financially strong and doing a profitable business; and we believe the Trade have had a good year, though just now they are overstocked. Retailers having raised their prices to the extent of the rise in duty a year ago, and having bought the crops for about 1d. per lb. less than before, it might be thought that they had made 1d. per lb. more profit on all they have sold to the public; but they have not done that, for although their quotations may be 2d. higher the average of their sales is not. A great number of consumers pay no more now than when the duty was 4d., and it is owing to this that the increased tax has injured the growers; consumers in the aggregate are only paying a portion of it and producers are paying the rest: the middlemen are untouched while those of them who took the 40 million lb. out of bond before the Budget last year and have filled their stores with free sugar have made additional profits.

Our Export Trade is also healthy and growing; it is larger, indeed, than it has been for many years, notwithstanding that we have lost so much of the China trade that used to pass through London, but is now done direct. Nine years ago the total was about 37 million lb., of which only 7 million lb. were Indian or Ceylon; in the interval the volume of business has been gradually contracting but during the past season it has risen to 43 million lb., 28½ millions of this being British-grown tea.

We have said there is encouragement for producers even in the statistics of such a bad season as the last has been: we find it in the fact that the world is now largely dependent upon India and Ceylon and in the evidence that the use of our tea is increasing. It is, therefore, not an exaggeration to say that Planters hold the key to the position, and by combined action, resolutely followed on the lines indicated, have it in their power to recover a considerable degree of prosperity.

PARASITIC PLANTS.

A LECTURE AT THE ROYAL INSTITUTION.

At the Royal Institution, on Saturday, Professor J B Farmer gave the first of two lectures on the "Biological Characters of Epiphytic Plants." Epiphytes, he explained, differed from parasites in demanding only lodging from their host, without also exacting a food supply. Permanent humidity was necessary for them, and they were found at their best in tropical forests. From their mode of life they derived the advantages that they were raised up to the light and were enabled to occupy a space which every kind of plant was not qualified to fill; the great disadvantage was the precariousness of the water supply. Plants could only manufacture food when the light was sufficiently strong and their cells were turgid. If the water-supply was scanty or intermittent they could either expose less green foliage and so lessen transpiration, or store water, or in rare cases endure being quite dried up. In one cactus (*Phipsalis*) there were no leaves, the green stems taking on their functions. In *Peperomia* the leaves were fleshy, with a water-jacket on the upper surface. The band of green tissue was thin, and above it were numerous rows of water-holding cells; as the water was used these collapsed and the leaf became thinner, thus preventing the entrance of air. Many orchids had two kinds of roots, one for attachment, the other for the storage of water. The latter were covered with a coat of strong-walled cells which would soak up water like a sponge. Pseudobulbs, *i. e.*, thickenings at the base of the stem and leaves, contained mucilaginous cells, which also retained water. When *Myrmecodia* was discovered in Java it was thought to be an ant's nest which had turned into a vegetable. Its tuberous base was channelled with galleries inhabited by ants, which were supposed to protect the plant from enemies. This theory, however, would not hold, for seeds grown at Kew developed plants with galleries and openings to the exterior, although no ants were present. The real use of the galleries was to aid respiration. Another orchid had fleshy leaves, some slimy inside and others modified into pitchers which caught the drops of water falling from the boughs on which the plant grew. By means of a root, running from the base of each leaf into this pitcher, the plant could utilise the water in times of drought.—London *Times*, June 3.

THE MANIA FOR CHEAP PRODUCTION OF TEA.

WHERE THE LONDON AGENTS AND DIRECTORS DO HARM.

This wild mania for cheap production swamps everything, without looking at ulterior results. What does it matter what it costs a manager to turn out his teas, so long as he gives a profit? Why look to cheapness if it is obtained at a loss in the price realized? It is this incessant desk work of irresponsible Directors without experience that has ruined half the big companies in India, and brought some to the verge of bankruptcy; and, unless stopped, will bring more. The manager of an estate is the best judge of how much money he should require, and, as long as it reveals a decent profit on overturn, should not be interfered with, unless in a fair honest way; in fact, as a rule, should require little or no criticism. What does it matter if A's tea cost 5 annas to make, if it realises 6, whilst B's costing 4 annas, sells for 3½? Some of our readers may quibble at our remarks, but let them follow the result of gardens last year, and they will find every word we have written verified. In the case of one company, which paid a dividend upon the prospective prices of the remainder of its crop, and afterwards revealed a loss, the Directors make as an excuse the exceedingly bad prices realised, the fault, they say, of the unfortunate manager, entirely forgetting that they had told him plainly how much tea he had to make, *not asking him*. If any one will mark the changes in the Directorate of many of our leading companies during the last year or two, a noticeable feature, they will find, will be the eager way in which old, retired and successful planters are pounced upon as a panacea for the present troubles; and in many cases, no doubt, they have done an immensity of good in restraining the spirit of government by mandate, which has of late years but too much made itself evident in the instructions communicated by London Boards to the local management. Of course there are exceptions to this, as in everything else; but we speak

of the mattter in a broad sense, and the London school of Directors have been for many years gravitating towards the Government style of voluminous reports and tables of statistics that take a long time to make up, and are practically nullified for this very reason. There is no reason why a manager should not have the question put in a fair and square way,—How much tea can you make at such and such a figure, and how much profit would you expect? or, Can you do better? if so, we are willing to entertain your views. It is absolutely absurd a man in an armchair in a London office saying, Oh! that's all nonsense, you must make so much tea per acre, and at so much, and unless you do this we will get another man. What is the result? The poor manager must try, and, as must be the case, he either makes his tea at the price named, and drops a penny per pound; or he falls far short of the quantity, aiming to keep quality up, and *finis*—gets the sack. Until the London Agents and Directors leave a little more to the judgment of their local managers, and treat them as sensible human beings, doing their utmost for their employers, so long will we have rubbish to contend with in the market, and the only ones to blame will be the Agents and Directors, more especially at Home, as those in Calcutta understand the position and often themselves share in the mud thrown at the manager.—*Indian Planters' Gazette*, June 22.

A DISTINGUISHED GERMAN COLONIAL BOTANIST.

HIS VISIT TO CEYLON.

We have omitted to make special reference to the departure of Dr. Stuhlmann, a distinguished German Botanist who has been visiting Ceylon and who left for East Africa via Aden in the "Hamburg" on the 24th inst., after having travelled all over India, collecting information which might be of use in the German Colonies. Dr. Stuhlmann had visited Java as well, buying seeds and plants for experiments to be started by the Government at Dar-es-Salaam, the promising capital of German East Africa—Dr. Stuhlmann is not only a prominent botanist, but also one of the leading officials in German East Africa. He has even been Acting Governor there. Dr. Stuhlmann is one of the few, if not the only one, remaining of the first generation of pioneers in German East Africa, his time of service extending over 14 years. He accompanied the well-known Emin Pasha on an exploring expedition into the interior of Africa, on which he afterwards wrote a book of world-wide fame.

RICE CULTIVATION AND PRACTICAL EXPERIENCE.

We are indebted to Mr. Elliott for giving our readers the results of his experience as regards one important department—the supply of water—in paddy cultivation. Irrigation Engineers would no doubt be all the better for a course of training in the actual growing of paddy. They have something to learn in regard to the best means of utilising water, and Mr. Elliott questions if the growing paddy or rice plant can have too much water? He instances the case of Burma with its abundant rains and heavy crops; but we suspect the latter are due even more to the rich alluvial soil than to the heavy rain. Still, a full water supply is undoubtedly necessary, and it is well to have the result of Mr. Elliott's personal experience as a rice-cultivator.

AFRICAN MARKET FOR CEYLON TEA
INTERESTING INTERVIEW WITH SIR HARRY JOHNSTONE, COMMISSIONER FOR UGANDA.
RELIEF FOR THE OVER-BURDENED MARKET: SUGGESTION TO EXPLOIT PORTUGAL.

A FIRM BELIEVER IN TEA-DRINKING AND THE PERMANENCY OF THE TEA-INDUSTRY.

On the O.R.M.S. "Orizaba" at Naples,

19th June, 1901.

We arrived here early this morning. The weather is lovely now, the sea like a mill-pond all the way from Port Said, and it is expected we shall reach London about 21st.

I had an interesting chat with Sir Harry Johnstone, Governor of Uganda, who joined the ship at Port Said *en route* to England, on furlough. His ideas on the tea industry are distinctly refreshing in these times, and I think worth consideration.

To begin with, he takes a keen interest in planting, studies the *Tropical Agriculturist* and the *Observer*, and has tried growing various products, including tobacco and tea; this last with but small success. In his opinion this depression in the tea trade will not last, it cannot last, and when it passes over, as assuredly it must, tea will be in as sound a position as ever. Moreover, if he had money to invest, he would have

NO HESITATION IN INVESTING IN CEYLON TEA PROPERTY.

Regarding the question of over-production, Sir Harry declares that Africa will be a great tea-drinking country—already the native tribes are taking to it; and provided tea is good, cheap, and easy to get, Africa, now only in its infancy, will do away with the fear of over-production; and there will be no question, he believes, of glutting the market with India, Ceylon or China teas. Africa, for various reasons, will never compete with recognised tea-producing countries, like India, Ceylon, and China.

Talking of the "Thirty Committee," why on earth, he said, do they not

EXPLOIT PORTUGAL?

There is a good field there for tea shops. Portugal, unlike Spain and France, is not a coffee and chocolate drinking country. It drinks tea, and drank tea long before we did ourselves, but tea is dearer there than it ought to be. Then Morocco is another country where tea is drunk all day long, and the "Thirty Committee" would do well to turn their attention to it. The other day

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he stopped at a café, and asked for some coffee; they told him they had only tea, and he was served with a delicious cup of tea,

There were great possibilities for opening up a trade in packet teas with the Arabs who of late have taken to drinking tea. If India and Ceylon turned their attention to these parts of the world, over-production would cease to cause alarm. Asked about the increased duty on tea, Sir Harry said he would have taxed fifty other things before he touched tea; he would have clapped the duty on, say, champagne, velvets, silks, and various foreign importations. Sir Harry, himself a good judge of tea, is a confirmed tea-drinker, and believes that tea is

DISTINCTLY BENEFICIAL, ESPECIALLY IN MALARIOUS REGIONS.

"Bad for the nerves and digestion, the Doctors say? Well, it has not injured mine," said Sir Harry, "and I don't care a rap for Doctors' fads. Much of the illness in Uganda is caused by scarcity of good cooks and good food, with too free and too frequent use of alcohol."

"EPIPHYTIC PLANTS."

SECOND LECTURE AT THE ROYAL INSTITUTION.

Professor J. B. Farmer gave the second and last of his lectures on the "Biological Characters of Epiphytic Plants" at the Royal Institution last Saturday. Some plants, he explained, began life as epiphytes, and later made connexion with the earth. The seed of the common india-rubber fig usually germinated in the fork of a tree; the roots grew down the trunk to the soil and were firmly glued to the bark by a cementing substance; any excess of cement was re-absorbed, the roots coalesced and soon enclosed the tree, causing its death. The fig continued its existence as an individual. In one epiphytic, *Anthurium*, the leaves formed a sort of funnel in which vegetable detritus accumulated, sometimes to the amount of 20 or 30 pounds, and in this solid matter the roots ramified. In a fern called *Drymoglossum* the root hairs stood absolute drying up, and when moistened new root hairs sprung from the bases of the old. In *Polypodium quercifolium* one kind of leaf manufactured carbohydrate food, while another kind resembling oak leaves were adpressed to the bark, forming pockets in which humus accumulated and in which the roots ramified. *Platycerium* also had two sorts of leaves; one for assimilation and one which, though becoming dead and brown, collected nutriment and water. Liverworts showed very diverse adaptations and occurred wherever there were epiphytes; they covered leaves or even grew on one another. In *Gottschea* the leaves folded over one another and held water by capillary attraction. In one species of *Physiotium* the leaves consisted of two lobes; one, acting as a gutter, conveyed water into the other, which was hollowed out and provided with a valve to prevent the escape of water. In *Physiotium acinosum* there were large sacs at the apex of the stem, which in most species contained the spore-bearing organisms, but had here become for the most part water reservoirs. *Frullania*, in addition to ordinary leaves, had pitcher-like leaves, which held water and in which small organisms lived. Lichens endured unlimited drying, and very little moisture served to swell them out and make them gelatinous. Only plants with small seeds or spores could attain to an epiphytic existence. After Krakatoa was blown up, the whole island was covered with red-hot cinders. Three years after these were overgrown with a gelatinous *alga*, in which new vegetation, chiefly ferns, had taken root. The spores had had a distance of 25 miles to cover, and only the smallest kinds could be borne so far. Few, even of small-seeded plants, could become epiphytes; success depended on the adaptability of the individual to change of environment.—London *Times*, June 11.

TEA DISTRIBUTION AMONG NATIVES.

AN APPEAL TO CAPITALISTS.

Up to date only some 300,000 lb. of tea have been subscribed to the scheme for disseminating our teas among the natives in this country. To ensure the project being a success, one million eight hundred and seventy thousand pounds is wanted; but, as is usual, in all matters relating to the welfare of the tea industry in this land, utter apathy is being evinced by those whose interests are most at stake. It is difficult to fathom the reasons for this only too apparent indifference, but one of the motives assigned is that the larger and more substantial proprietors (who are in a position to pull through the crisis and stand a prolonged strain, having ample means at their back) do not wish their weaker brethren to pull through, as it will be to their advantage if they fall in the struggle and go to the wall. In such cases it is the essence of selfishness which is at the bottom of the great want of support, which is at present so conspicuous. To eliminate self-greed is impossible, and we fear that the small concerns, with no reserves in the way of capital to help them to pull through, will ultimately have to cave in and give up a hopeless contest against adverse circumstances. This is the age for great things, for colossal undertakings, but compressed into one word they simply mean "Money." Without capital nothing can be done; with capital there is nothing that cannot be done. It is hopeless, therefore, for those who have not capital to try and compete with those who have. But this is no reason why capitalists should hold back at the present juncture; yet, we are told they are doing so, in the hope that they will thereby wipe the indigent concerns out of existence.—*I.P.G.*, June 8th.

THE POSITION IN CASSAVA.

A recent analysis made by Professor Carmody, Government Analyst, confirms the previous work of Francis as to the presence of Prussic acid in sweet cassava, the proportion found varying from 0·005 to 0·019 per cent. The skin was found to yield from 0·014 to 0·042 per cent., while the inner part gave only 0·003 to 0·015 per cent. The interior part of bitter cassava yielded 0·013 to 0·037 per cent., while the skin and outer layer yielded from 0·012 to 0·035 per cent. Peeling sweet cassava before cooking is therefore a wise precaution. Professor Carmody also suggests that the acid may in part be formed by fermentative change.—*Trinidad Bulletin*.

New Zealand for Honey.—A shipment of honey recently made by a Poverty Bay (N Z) settler realised £42 10s per ton in the London market. The settler in question has been obtaining an average yield of 90lb. honey per hive during the season.—*Sydney Mail*, June 1.

SUNSPOTS AND CLIMATE: J. NORMAN LOCKYER ON THE RECENT "SUNSPOT; ITS BEARING ON LOCAL METEOROLOGY.

Sir J. Norman Lockyer first took an active interest in the climate of India and the application of the Sunspot and Rainfall Cycle theory, when he came out to the East to observe the Eclipse of 1871. In a long paper to *Nature* of December 12th, 1872, on the "Meteorology of the Future," the distinguished Astronomer mentioned how, while preparing to go to India, he got valuable information from the editor of the *Ceylon Observer* (the late Mr. A. M. Ferguson) who happened to be in London, as to the time of year at which the monsoons broke up in the island. "Nor was this all; he added"—said the Astronomer—"that everybody in Ceylon recognised a cycle of about 13 years or so in the intensity of the monsoon, that the rainfall and cloudy weather were more intense every 13 years or so. This, of course, set one interested in solar matters thinking; and I said to him: 'But are you sure the cycle recurs every 13 years? Are you sure it is not every 11 years?'—adding as a reason that the sunspot period was one of 11 years or thereabouts and that, in the regular weather of the tropics, if anywhere, this should come out."

Our senior sent us out an account of his conversation with Mr. Lockyer, as he was then, and on our publishing it in the *Observer*, the late Mr. R. B. Tytler—who in his too dry Dumbara Valley paid great attention to Meteorology—wrote to us to point out that Mr. Lockyer was right, that the cycle period in Ceylon was one of 11 years—five or six years dry and five or six years wet—although occasionally thirteen years might more accurately represent local experience. This statement was sent to Mr. Lockyer who at once paid special attention to our local records, getting also corroborative returns from Mr. Meldrum of Mauritius, from Brisbane and Adelaide, and later from Madras and the Cape. These he worked up in a paper for *Nature* on "The Meteorology of the Future." Recognising the eleven-year cycle, he declared that the true cause had yet to be discovered and for this two things were necessary: an accurate knowledge of the currents of the sun, and, secondly, of the currents of the earth. Photography and Spectrum Analysis were necessary for the former and for the latter the pursuit of Meteorology as a physical science.

Ever since that time, now thirty years ago, we have, in our "Ceylon Handbook and Directory," endeavoured, in our "Meteorological,' to meet the requirements of the "Director of Solar Physics," so far as the maintenance of local statistics and observations is concerned. The dates of the advent of successive monsoons and of the annual rainfall are complete for well-nigh fifty years and we have had Mr. Archibald analysing the same with a view to shew the close connection between the Sunspot Cycle and the advent and magnitude of the Monsoon. The subject is, of course, of far more practical importance to India—so often the scene of famine—than to Ceylon; but it is not without a good deal more than theoretical interest even in this favoured island. For, in respect of coconut and paddy cultivation (as well as a good deal of fruit and root culture in certain districts,) a poor monsoon or a dry season makes a world of difference.

We cannot say, however, that much progress has been made during the past thirty years in arriving at the results desiderated by Sir Norman Lockyer in 1872. But that gentleman has never lost his interest in a subject which is, of course, so closely related to his daily work as the "Director of Solar Physics Observatory, South Kensington"; and in *Black and White* of June 15th, we find an illustrated article headed "The Dream of a Great Scientist: what a Sunspot may mean for the human race." The veteran Astronomer is a firmer believer than ever as to the relation of solar influence upon terrestrial meteorology, and he has even now gone so far as to express the hope that, in a few years' time, meteorologists will be able, as the result of observation of solar phenomena, to predict the time, and even perhaps the place, in India, in which famine may be expected, so enabling precautions to be taken against loss of life; and that they will also be able to give warning of high and low floods in Egypt. Of more immediate importance is the following statement made in the course of this interview:—

> The sunspot observed lately he regards as of the greatest importance. "It shows us, beyond all question, I think," he informed the writer, "that the minimum is past. And that is a very important matter. It is very remarkable that a spot in the minimum period, apparently the first spot of a new cycle, should be of such magnitude. We are working at it, but cannot say anything definite for the moment. It will take some time before any certain pronouncement can be made, but it looks very much as if it will enable us to fix the period of the minimum, which before was uncertain to a year. If we can fix that, it will be very helpful for subsequent work."

We take it that, in saying "the minimum is past," Sir Norman Lockyer means the period of dry or short rainfall years, more especially in India. We have not the figures of rainfall for the Central or North-West Provinces of India before us as we write; and the Madras Presidency has had no trouble with famine or short crops of late years, or a study of our meteorological returns might be of interest. But, as a matter of fact, in respect of Colombo at least, our rainfall is more distinguished for alternate years of heavy and light returns than for the periodicity of the larger cycles of dry and wet years. Thus, beginning with 1890, we get the following alternation:—

Year.		Rainfall inches.	Year.		Rainfall inches.
1890	...	72·80	1895	..	92·23
1891	...	119·03	1896	...	101·06
1892	...	60 83	1897	...	82 73
1893	..	89 67	1898	...	103·11
1894	...	77·46	1899	...	73·48
			1900	...	83 68

It will be seen that 1896 breaks the alternation and a new series then begins, although

the fall of 1900 must be reckoned short (by five inches, of the average, and therefore we ought, with two scanty years in succession, to have an unusually heavy rainfall for 1901. That does not always follow, however, for in the "seventies" we had four years in succession with an abnormally low rainfall:—

	inches.		inches.
1871 ...	65·09 ...	1873 ...	85·62
1872 ...	62·07 ..	1874 ...	57·03
		Total...	269·81
Normal Annnal Average; 88.03 inches × 4=			352·12
		Deficiency in 4 years ...	82·31

But to expect two more years—1901-2—of abnormally low rainfall in Colombo, would be contrary to the Astronomer's declaration that "the minimum is past" (and we suppose that he has no fear of a recurrence of famine in India for some years at least.) So far as the present year has gone, the first half shows a fall well up to the average, and by the end of December the prospect may well be of a total which will bear out Sir Norman Lockyer's belief that "the minimum is past." So mote it be, we say, in the interests of local paddy and coconut farmers; but still more with reference to the vastly more important claims of India throughout its length and breadth.

It only remains to be mentioned that taking our Colombo Rainfall returns from 1870—the year when the late Colonel Fyers established the Colombo Observatory (although it remains for Governor Ridgeway to place it on a proper footing before he leaves us)—the average for the eleven years 1870-1880 was 86·82 inches (a dry cycle comparatively) and of the next series 1881-1891, the average was 92·16 (or 4 inches above the average); while for the current cycle the average for the nine years expired is 84·58, pointing to another dry period and so far maintaining the law of the eleven-year cycle and its alternations, although in the case of the South West division of Ceylon —situated in the pathway of both monsoons —the difference between a wet and dry period, as illustrated above,—86·82, 92·16, 84·58 inches—is comparatively slight. Nevertheless, when we recall the fact that in 1874 the total rainfall was so low as 57·03 inches, and in 1878 so high as 139·70, we must bear in mind that, highly favoured as Colombo is, it is not beyond the influence of a tryingly dry season, involving poor crops of coconuts, rice, vegetables and fruit generally, or again of a season of heavy continuous rainfall—with all the injury which sudden and persistent flooding means to thousands of the people in the low-lying Colombo and neighbouring districts.

RAW RUBBER NOTES.

NICARAGUA.—Mr. Consul Chambers, in his report of trade in Nicaragua for 1909, states:—Rubber is getting more scarce every year, and the planting of rubber trees has not been taken up to any extent, possibly through the long time necessary before any result is seen, and the difficulty of preventing stealing. The Government allows a bonus of 1 dollar currency (abont 1s 5d) on every rubber tree planted in certain districts, also 5c currency (1d) for coffee trees, 20c currency (3½d) for every cocoa tree, and 10c currency (1¾d) for every pound of indigo exported. During the year 1900, in order to benefit agriculture, the Government allowed the free transport of coffee to Corinto on the railway, also free transport of maize and plantains, when solicited, for the use of the estates. Through this concession, it is estimated, the Government lost 135,829 dollars 5c currency (100,611) in freight.

BRAZIL.—The report of Mr Acting-Consul Temple on the trade of Para and district for the year 1900 has just come to hand. In it he comments upon the commercial crisis which has occurred in the Amazon Valley during the past year, and, although many similar crises have occured in past years, none has been experienced so diastrous or so wide reaching in its effects as that which developed during the spring of last year. Rubber, which still maintains its position as the chief item of export from Para, continues to show a steady increase in the total exported from the Amazon Valley, including Bolivia and Peru. In twenty years the total quantity has more than trebled the export in 1880 amounting to 8,635 tons, while that for 1900 amounted to 26,693 tons. Only in 1897 did the amonnt of any year fall short of the preceding one, and this was only abont sixty tons. A considerable stir has been caused by the recent re-enactment on the part of the Congress at Manaos of a law which was referred to in our issue on the 1st ult, whereby all rubber produced in the State of Amazonas must be disembarked in Manaos, examined, classified, re weighed and boxed up. This would entail a great quantity of rubber, which has hitherto been dealt with at Para, being treated at Manaos, and shipped direct from there without touching the port of Para. The Consul in his report says:—Trade has, however, a conservative tendency; in additi n to this, the fact that the subfluvial cable which connects Manaos with Para has up to the present been so liable to interruption that no reliance could be placed upon it, and has caused a large proportion of the trade, which would naturally go to Manaos, to remain at Para. In justification of this law, the Legislature states that the Revenue collectors are not able to calculate the export duties in a satisfactory manner, whilst the rubber is in "pelles," and that it is necessary, in order to secure the interests f the Treasury, that fine rubber should be separated from the inferor grades before leaving the State. A land cable has been suggested, but it has been considered almost impossible, owing to the luxuriance of the forest growth which would cause as manny interruptions as occur to the cable in the bed of the river. As Ma aos is, therefore, not in such close touch with the exchange and produce markets, the merchants buying at Manaos must always risk a large loss, especially with an article like rubber, which is subject to such rapid fluctuations.

Although the effect of the Amazonas rubber being handled at Manaos wonld deprive Para of a considerable amonnt of trade, yet it must not be supposed that Para would be entirely eclipsed. Taking the total crop to be about twenty-six thousand tons per annum, eleven thousand tons of up-river would probably be handled at Manaos, and nine thousand tons of island at Para. Of the remaining six thousand tons coming from Bolivia and Peru, a certain quantity would still be handled at Para, thus bringing up the trade of the latter port to about the same total as the former. The probabilities of increase in production are about the same for both States. The total crop of rubber shipped from the Amazon Valley during the year was 26,881 tons, of which 12,474 tons went to the United States, and 14,407 tons to Europe. Of this quantity, the State of Para produced 5,000 tons, Amazonas 4,300 tons, Peru 123 tons Bolivia 465 tons, making a total of 9,888 tons, of fine

with a total value of £4,906,000. Of this 5,100 tons went to the United States, 4 466 tons to the United Kingdom, 260 tons to France, fifty tons to Italy, and twelve tons to other European countries. The total export of entrefine amounted to 1,124 tons, with a value of £402,000. This was about equally divided between the United Kingdom and the United States, a small quantity going to France and Italy. The State of Para produced 4,000 tons of Sernamby, Amazonas 913 tons, Peru forty tons, Bolivia 235 tons, making a total of 5,188 tons, valued at £901,000. Of this amount the United States received 4,398 tons, the United Kingdom 664 tons, France 115 tons, and Italy eleven tons. Of Caucho amounting to 1,092 tons, valued at £210,000, chiefly produced in the State of Amazonas, about one-half went to the United States and Europe.—*India-Rubber Trades' Journal*, May 13.

THE ALDABRA ISLANDS.

AN OUTPOST OF EMPIRE: LEASED FROM THE SEYCHELLES GOVERNMENT.

The curious group of islands lying north-west of Madagascar, and known as the Aldabra group, have recently changed hands. The Government of the Seychelles Islands, of which politically Aldabra forms part, has leased the group for a term of thirty years to Messrs Bates, Bergne & Co., acting for the Hon. Walter Rothschild, M P., and themselves. Mr Rothschild's interest in the islands is probably derived from their remarkable fauna. Aldabra is almost the sole habitat of that antediluvian relic, the gigantic land tortoise, and is certainly the only spot in the world where that reptile flourishes. Some of these tortoises might have been seen in the Bombay Dockyard last September on their way to Mr. Rothschild's zoological gardens at Tring Park. Certain birds and insects, too, are believed to be peculiar to these islands. Besides Aldabra proper, which consists of a ring of land broken by channels and surrounding a lagoon about fifty square miles in extent, the group includes Cormoledo, an atoll of similar formation Astove and Assumption Islands. At the west end of the Aldabra lagoon there is a fine land-locked harbour named after H.M.S. Euphrates, and capable of giving shelter to the largest fleet. Owing to the large volume of water in the lagoon and the lack of sufficient outlet the tides are at times very strong, which is rather a drawback Aldabra itself contains little land capable of cultivation; on the other islands, however, there are hundreds of acres suitable for coconut plantation, and the lagoons and coasts of the whole group swarm with fish and turtle, including the hawksbill variety, the source of the so-called tortoise-shell. An interest attaches to these islands from another point of view. In 1894 the French flag was hoisted on Glorioso Island, less than one hundred miles south of Astove. Before that date Glorioso, with some adjacent islets, had been considered British territory and was included in the list of the Dependencies of Mauritius. Aldabra is now the outpost of the British Empire to the west of the Indian Ocean, with the Comoro Islands, Glorioso and Madagascar stretching in a French semicircle from the south-west to the south-east. Glorioso was lost, it is said, solely from the lack of a British flag or from the neglect to hoist it; it is to be hoped that the lessees of Aldabra will take proper precautions against similar aggression.—*Times of India*, July 1st.

TROUT AND GAME IN NEW ZEALAND.

The Auckland Acclimatisation Society is doing its best to stock with trout all the suitable streams in the district, but their efforts are greatly discounted by the devastations of shags. If, therefore, the country settlers desire to profit by the efforts of the society, they would do well to further their intention by the destruction of these voracious birds. Few people are aware of the havoc they make. The number of young fish they destroy is almost incredible; some persons put the number they devour as high as 50 per cent of those distributed.—*Auckland Weekly News*, June 7.

Mr. Ernest Grogan, the African explorer, has been in communication with the Wellington Acclimatisation Society, and has informed it that there are many varieties of African game which would adapt themselves admirably to a New Zealand environment, and indeed thrive vigorously on the vast waste spaces of the north. He is insistent, however, that any importation of the best varieties which are projected must immediately be undertaken, because several of the species are on the verge of extinction. Indeed, he says, the transportation of these species to the colonies is the only means to prevent them being entirely lost sight of.

Mr. Avson, Inspector of Fisheries, is circularising the various Acclimatisation Societies of the colony, asking them to co-operate with the Government in securing the importation of South African game of different varieties, as recommended by Mr. Ernest Grogan.—*New Zealand Mail* (Wellington) June 6.

BRAZILIAN "RUBBER" FARMS FOR SALE.

We have before us descriptions of several "rubber farms" in the Amazon river country that are for sale. Some of them are offered by the proprietors, and others by banks at Para, which, having made advances to the owners of the "farms," have taken over the properties in default of payment. We do not know the merit of these particulas opportunities for investment, but the fact that they exist suggests several points of interest.

In the first place, the rubber gathering business probably is better organized than most of us hitherto have supposed. It appears that the 50,000,000 pounds or more of rubber annually exported from the Amazon is not gathered mainly by half-savages, roaming in vast forests, tapping at random such rubber trees as they may chance to find. It would require more than such haphazard methods to form the basis for the business of the banks and mercantile houses of Para and Manaos, the hundred or more steamers on the Amazon, and the rubber-carrying ships on the Atlantic which transport not infrequently a cargo of rubber worth $1,000,000 or more.

On the contrary, each of the "rubber farms" is described as consisting of a definite number of *estradas* (paths, or roads), marked out so as to give ready and certain access to the particular rubber trees to be

tapped, the approximate number of trees also being given. This preliminary work of road making is not done for a single season, but is meant to be permanent so that, when a plentiful supply of prolific trees is once located on a navigable stream, they may be visited season after season, with an assurance of a yield that will prove profitable. From one description we quote: 'This farm was marked off five years ago, for which service was paid 40 contos of reis (equivalent today to $10,000)." The number of trees on this estate is estimated at 20,000. There are also said to be on the farm wooden buildings, cattle, etc., besides which four steam launches are owned. Doubtless on an estate where the business of rubber gathering has been prepared for with so much forethought and at such expense, we might today see a force of workers established all the year round, but for the fact that the annual rising of the rivers scatters the rubber hunters for a certain period. As it is, the crop season, during which the trees are tapped daily, is something more than six months in the year.

It may be asked why, in the face of such preparations and the presence of rubber in paying quantities, the owners of these farms should want to sell. The reason given is the financial depression from which all Brazil is suffering. Any manufacturer who buys Pará rubber is prepared to believe that somewhere, between the forest and the factory, good profits are made on it. The owners of many of these farms have profited largely, but their money has been made too easily for any thought to have been taken for the morrow. Hence the beginning of each new season finds most of them with nothing but their *estra as*, waiting to be worked. They must send for workers, and provide for them until the proceeds of the year's crop come to hand, all of which makes necessary advances from merchants or bankers who are generally at a distance. Whatever may be the prime cause, money is now a scarce article in the rubber country, the rate of exchange is most unfavourable, and credits have become contracted to an extent which leaves the weaker operators helpless. It is quite possible that the number of persons in the rubber gathering business, and the number of estates, affected by the Brazilian financial crisis will be so great as to curtail seriously the production of rubber during the coming season.

All of which leads to the thought that, if the Para rubber already produced has come to an important extent from systematically marked out farms, visited year after year by workers under the same control—albeit the general management of these estates may have been wasteful and improvident—there may be a good opportunity for the investment of capital by outsiders, on a basis of cash capital instead of advances of goods and credit, in very large tracts of rubber lands, to the profit of the investors, while rendering the supplies of rubber more stable and the ultimate cost to the manufacturer lower.—*India Rubber World* June 1.

THE RUBBER PLANTING INTEREST.

RUBBER PLANTING IN SOCONUSCO.

The Soconusco Rubber Plantation Co., incorporated under California laws, October 16, 1900, to develop a plantation in the Soconusco department in the state of Chiapas, in the extreme southern portion of Mexico, was organized by Mr. Charles G Cano, C.E., who is its general manager. The company own 17 858 acres and are preparing to plant rubber on an extensive scale. They expect to ship considerable rubber this year from native trees on the property. This property is near the estates of La Zacualpa Rubber Plantation Co., comprising 18,791 acres, and which has been mentioned several times in *The India Rubber World*. This company, besides planting largely on their own account, have acquired a plantation formed ten years ago or more, from which some rubber has been shipped. In the same region is the rubber estate Los Cerritos, on which 40,000 trees were planted eleven years ago, and which was sold recently by Rafael Ortega to Louis Tomalen for a large sum. Still another enterprise there is the Dona Maria Rubberot Plantation Co., with 5,288 acres, owned by F A Quimby. Mr. Cano, mentioned above, has also interested eastern capitalists recently in forming the Pacific Rubber Co., for planting rubber, which has just been incorporated under Maryland laws. Mr. Cano is interested in the sale of other lands, on a large or small scale, suited for rubber planting, either alone or in connection with other crops, and may be addressed for the present to the care of *The India Rubber World.*

It is in this department, by the way, that the late Mexican ambassador, Senor Romero, made a rubber plantation in 1873. Some of the trees then planted still survive, in spite of long neglect, and rubber gathered from them formed a part of the Mexican exhibit at the Paris Exposition of 1900. The identical lands are now under control of Mr. Cano.

PLANTING "LANDOLPHIA" IN AFRICA.

The Compagnie Anversoise des Plantations de Lubefu, formed in Belgium in 1897 to trade in Africa, with 600,000 francs capital, and which have been shipping considerable rubber from the Congo, are reported in *Congo Belge* as having commenced a plantation of *Landolphia* rubber vines on the river Lubefu, to cover 1,000 hectares =2,471 acres besides which the company have an option on 4,000 hectares more, for the same purpose.—*India Rubber World*, June 1.

FAILURE OF THE CAMPHOR MONOPOLY IN FORMOSA.

OWING TO INCREASE OF PRODUCTION IN JAPAN

The failure of the camphor monopoly in Formosa is supposed to be caused by the unexpected increase in the production of the staple in the interior of Japan, with the result that the markets in Japan and abroad have been considerably affected. It was therefore thought necessary by the last Cabinet to extend the monopoly to Japan, so as to maintain the price of the staple and protect the monopoly in Formosa. A proposal to this effect was agreed to by the last Cabinet. Viscount Katsura, the Premier of the new Cabinet, is reported to take special interest in the finances of the territory, as he was for a time the Governor-General of Formosa, and it is believed he will take up the proposal of the last Cabinet and favour the extension of the camphor monopoly to Japan. The *Kobe Chronicle* says:—It is stated that, if such a Monopoly Bill is passed, the export of camphor from Japan will be undertaken by the Agricultural and Commercial Department; and that Monopoly Offices will be established at Nagasaki and Kobe, the head office being at Kobe. The purchase price of camphor will be fixed at 75 yen per picul for Kobe, and 65 yen per picul for Nagasaki, while the sale price will be 85 yen per picul From these particulars it would appear the Government has practically decided to introduce such a Bill.—*Hongkong Press*, June 22.

The Orange Industry.—It is said that more oranges are grown at Riverside, Cal., than in any other city of equal area on the face of the earth. Out of fifty-six square miles, which is the area of Riverside, thirty square miles have been converted into orange groves. This means that the coming season's product will "aggregate," as Americans say, about 3,200,000 boxes of oranges. This represents a money value of 6,000,000dols.—*Morning Leader*, June 15.

RUPEE COMMERCIAL COMPANIES.

RISE AND FALL DURING 1900-01.

	Ordinary Capital. R.	Quot. Jan. 1901. R.	Quot, June 1901. R.	Rise or Fall.* R.
Adam's Peak Hotel ...	113,800	28,450a	34,140	5,690
Bristol Hotel ...	315,000	393,750	393,750	—
Ceylon General Steam Navigation ...	75,000	161,250	168,750	7,500
Colombo Apothecaries ...	400,000	472,500	550,000a	78,000
Colombo Assembly Rooms ...	28,760	21,570	21,570a	—
Colombo Hotels	500,000	1,475,000	1,462,500a	—12,500
Colombo Fort Land Building	360,000	324,000	306,000	—18 000
Galle Face Hotel	500,000	700,000	762,500a	—62,500
Kandy Hotels ...	250,000	312,500	306,250	— 6,250
Mount Lavinia Hotel ...	350,000	129,500a	129,500d	—
New Colombo Ice	210,000	399,000	420,000	21,000
Nuwara Eliya Hotels ..	42,000	49,000	31,500a	—17,500
Public Hall ...	55,000	28,000	24,500	— 3,500
Total ..	3,179,560	4,494,520	4,610,960	116,440

SUMMARY.

	36 Produce Companies. R.	13 Commercial Companies. R
January 1901	11,879,035	4,494,520
June 1901	10,361,712	4,610,960
Fall ...	1,517,323	Rise 116 440

RUPEE PLANTING OOMPANIES.

RISE AND FALL DURING FIRST HALF OF 1901

	Ordinary Capital. R	Quot, Jan. 1901. R	Quot, June 1901. R	Rise. or Fall.* R
Agra Ouvah	..375,000	750,000	675.000	— 75,000
Castlereagh	...240,000	228,000	180,000	— 48,000
Ceylon Provincials	..666,000	666,000	666,000	—
Ceylon Tea and Coconuts	...348 000e	—	—	—
Claremont	... 65,000e	—	—	—
Clunes	...332,000	249,000	249,000	--
Clyde	...270,000e	—	—	—
Doonoo	..400,000	260,000	240,000	— 20,000
Drayton	...715,000e	—	—	—
Ella	...300,000	120,000	120,000	—
Estates of Uva	...710,500	355,250	355,250	—
Gangawatte	..178,500e	—	—	—
Glasgow	...325,000	633,750a	6[illegible]1,000	— 22,750
Great Western	...584,000	730,000	700,800	— 29,200
Haugahalande	170,000e	—	—	—
High Forests	...750,000	900,000	825,000	— 75,000
Do. Part Paid	200,000	212,500	2[illegible]5,000	12,500
Horrekelly	..400,000	280,000	260,000a	— 20,000
Kalutara	...400,000	240,000	200,000	— 40,000
Kanapediwatte	...334,000	300,600	283,900	— 16,700
Kandyan Hills	...125,000	87,500	50,000	— 37,500
KelaniT. Gardens	300,000e	—	—	—
Kukles	..100,000	120,000	120,000	—
Knavesmire	...415,000	269,750	249,000	— 20,750

* Figures prefixed by a "—" denote falling-off while the rest show increase.

a Buyers' quotations in the absence of those by sellers.

b Nominal quotations.

c Transactions in April.

d Last quoted price.

e No quotations are given for these Companies.

RISE AND FALL DURING FIRST HALF OF 1901

	Ordinary Capital. R	Quot. Jan. 1901. R	Quot. June 1901. R	Rise. or Fall.* R
Maha Uva	...300,000	255,000	240.000	— 15,000
Mocha	...404,000e	—	—	—
Nahavilla	..396,500	297,375	237,900	— 59,475
Neboda	...261,000	261,000	261,000	—
Ottery	...29[illegible],000e	—	—	—
Palmerston	...410,000	369,000	328,000	— 41,000
Penrhos	...150,000	150,000	150,000	—
Pine Hill	...208,740	173,950	130,462	— 43,488
Pitakanda	..305,000e	—	—	—
Putupaula	...200,000	240,000	—	—
Ratwatte	...125,000e	—	62,500	— 62,500
Rayigam	...600,000	300,000	240,000	— 60,000
Roeberry	...300,000	210,000	135,000a	— 75,000
Ruanwella	...265,000	79,500	79,500	—
St Helier's	... 50,000	51,000a	50,000	— 1,000
Talgaswela	...200.000	70.000	70,000	—
Tonacombe	...280,000	196,000	182,000	— 14,000
Udabage	...170,000e	—	—	—
Udugama	...315,000e	—	—	—
Union	...320,000	128,000	128,000	—
Upper Maskeliya	350,000	297,500	315,000	17,500
Uvakellie	...240,000	168,000	132,000a	— 36,000
Vogan	...720 000	432,000	360,000	— 72,000
Wanarajah	...378,000	801,360	680,400c	—120,960
Yataderia	...190,000	665,000	570,000	— 95,000
Total	16,301,040	11,879,035	10,361,712	—1,517,323

STERLING PLANTING COMPANIES.

(Continued.)

RISE OR FALL BETWEEN JANUARY AND JUNE 1901,

Name of Company.	Paid-up Capital. £	Highest Quot. June 1901	Highest Quot. Jan. 1901.	Rise or Fall.
Alliance Tea Co. ...	65260	58734	58365	369
Anglo-Ceylon General Estates ...	250000	137500	112500	25000
Associated T Estates of Ceylon ...	50000	12500	12500	—
Bandarapola Tea Co.	7000	5600	8400	—2800
Do do	14000	11200	16800	—5600
Battalgalla Est. Co.	15000	30000	30000	—
Bogawantalawa District Tea Co. ...	100000	110000	110000	—
Burnside Tea Co. ...	6000	4800	6000	—1200
Do ...	11600	8700	11600	—2900
Caledonian (Ceylon) Estates, Ltd. ...	35000	Nominal	Nominal	—
Carolina Tea Co. ...	50000	50000	50000	—
Do Deferred	10000	Nominal	Nominal	—
Central Province ...	50000	20000	26000	—
Central Tea Co. of Ceylon ...	22500	24750	24750	—
Ceylon Land & Produce ...	5500	13200	13200	—
Do Cocoa and Coffee ...	19200	51200	51200	—
Ceylon & Indian P.A.	40000	32000	32000	—
Ceylon Estates Investment ...	30000	30000	30000	—
Ceylon Proprietary Tea Estates ...	78380	39190	48987	— 9797
Ceylon T Plantations	167380	401712	418[illegible]50	—16738
Consolidated Estates	3[illegible]0	27300	31200	— 3900
Dimbula Valley T Co.	114665	126132	137598	—1146[illegible]
Duckwari Tea Plantation ...	8000	8000	8000	—
Eastern Produce and Estates ...	298250	238600	298250	—59650
Edarapola Tea Co. of Ceylon ...	25500	19350	25500	— 6150

RISE OR FALL BETWEEN JANUARY AND JUNE 1901.

Name of Company.	Paid up. Capital. £	Highest Quot. June 1901	Highest Quot. Jan. 1901.	Rise or Fall
Galaha Tea Estates & Agency Co. ..	50000	Nominal	Nominal	—
General (Ceylon) Tea Estates ...	109350	Nominal	Nominal	—
Goo[illegible] (Ceylon) T Estates .., Ld....	8500	Nominal	Nominal	—
Haputale Co. ..	8834	4417	4417	—
Highland Tea Co, ...	32000	32000	32000	—
Horana Tea Estates	12000	Nominal	Nominal	—
Hunasgeria Tea Co.	22728	11364	11364	—
Imperial Ceylon Tea Estates ..	90000	40500	49500	— 9000
Kelani Valley Tea Association ...	2530	2530	£3036	— 500
Do do	16235	16235	19482	— 3247
Kellie Tea Plantation	20000	Nominal	Nominal	—
Kintyre Tea Estates	45000	36000	36000	—
Korale Estates ...	13000	—	—	—
Lanka Plantations...	150000	67500	75000	— 7500
Mayfield Tea Co. ...	30620	15310	15310	—
Maduisima Coffee & Cinchona Co. ..	68000	Nominal	Nominal	—
Maturata	8000	10400	10400	—
Nahalma Estates Co.	14000	Nominal	Nominal	—
New Dimbula Co. ...	78954	236862	236862	—
Nuwara Eliya T Est.	200000	200000	210000	—10000
Ouvah Coffee Co. ...	100000	70000	70000	—
Panawal ...	17000	17000	17000	—
Poonagalla Valley Ceylon Co. ...	10000	5000	10000	— 5000
Do do ...	7500	3750	7500	— 3750
Portmora Tea Co. ..	40000	60000	60000	—
Pundaluoya Tea Co..	66000	79200	79200	—
Ragalla Tea Estates	39000	39000	39000	—
Rangalla Tea Co. ..	22000	22000	22000	—
Scottish Ceylon T Co	41000	61500	61500	—
Scottish Trust and Loan Co. ...	45000	45000	75000	—30000
Spring Valley Coffee Co. ...	80000	40000	28000	12000
Standard Tea Co. ...	20500	45100	45100	—
Do Ordinary	39000	78000	74750	3250
Sunnygama Tea C.	50000	30000	30000	—
United Planters of Ceylon ...	156400	172040	153340	18700
Vellikellie Tea Co...	35250	35250	35250	—
Yatiyantota ...	90000	49500	67500	—18000
Total	...335 636	3030926	3133812	—102886

The Agri-Horticultural Society of Madras was established in 1835 and has had a useful career. From the annual report just to hand, we quote:—

Receipts and Expenditure.—The receipts from various sources, *viz*:—Sale of seeds, plants, sundries, admission tickets at the Flower show, subscription from Members, and Government grants amounted to R11,872-3-3 and the expenditure by pay of establishment, purchase of seeds, plants, erecting palm house, cisterns, printing advertising, &c R11,329-5 3, leaving a balance of R542-14-0.

Bread fruit (seedless)—The one sent to us from the Peradeniya gardens, planted out near a water channel, is now about 25 feet high and bearing fruits for the last 4 years. The other plant from the Laccadives planted in an open place and getting only a scanty supply of water is not more than 8 feet high and bears a sickly appearance—now dead.—Landolphias—L Kirkii and L florida, two African rubber climbers. The former is a delicate twining plant producing fruits in profusion, and the latter is a giant, covered up four trees already but did not fruit as yet. Ficus Vogelli—This rubber plant has made no progress yet. Evidently the climate doef not suit it.

AN INTERESTING TEA TABLE.

Memo: shewing a Weekly Sale of Tea at intervals of three months—from 5th August, 1898, for three Years.

Week ending.	5th Aug., 1898.	4th Aug., 1899.	3rd August, 1900.	4th Nov., 1898.	3rd Nov., 1899.	2nd Nov., 1900.	3rd Feb., 1899.	2nd Feb., 1900.	1st Feb., 1901.	5th May, 1899.	4th May, 1900.	3rd May, 1901.
Weekly Average. Indian— ..	10·38	7·81	7·37	8·35	8·84	7·34	9·34	7·71	6·59	8·91	7·72	6·48
Ceylon— ..	—	7·73	7·28	8·41	8·43	7·56	8·05	7·25	6·40	8·15	7·16	6·63
Mean— ..	—	7·80	7·35	—	8·70	7·50	—	7·50	6·55	8·45	7·50	6·55

Prices of Tea.	5th Aug., 1898. No. Packages.	Per Cent.	4th Aug., 1899. No. Packages.	Per Cent.	3rd August, 1900. No. Packages.	Per Cent.	4th Nov., 1898. No. Packages.	Per Cent.
10d and upwards. ...	1,673	59·37	285	3·02	3 586	7·38	11,430	19 55
9d to 9¾d. ...	181	6·42	1,298	13·78	4,379	9·01	10,776	18·42
8d to 8¾d. ..	637	22 60	1,967	20·89	6,042	12·43	10,640	18·19
7d to 7¾d. .	197	7·00	3,927	41 67	12,626	25·99	12,969	22·18
6d to 6¾d. ..	130	4·61	1,945	20·64	18,301	37·66	8 549	14·62
5¾d and under. ..	—	—			3,657	7·53	4,111	7 04
	2,818	100·—	9,422	100·—	48,591	100·—	58,475	100·—

Prices of Tea.	3rd Nov., 1899. No. Packages.	Per Cent.	2nd Nov., 1900. No. Packages.	Per Cent.	3rd Feb., 1899. No. Packages.	Per Cent.	2nd Feb., 1900. No. Packages.	Per Cent.
10d and upwards. ...	13,517	23·39	7,513	11·79	16,823	26 80	4,378	6·97
9d to 9¾d. ...	10,400	18·00	7 465	11 72	7,807	12·43	3,566	5·68
8d to 8¾d. ..	11,436	19·79	10,309	16 18	12,270	19·56	12,318	19 62
7d to 7¾d. .	18,497	32·01	7,433	11·67	18,502	29·49	17,573	28·00
6d to 6¾d. ..	3,900	6·75	12,297	19·31	6,013	9·58	24,114	38·42
5¾d and under. ..	34	·60	18,681	29·33	1,347	2·14	821	1·31
	57,784	100·—	63,698	100·—	62,762	100·—	62,770	100·—

Prices of Tea.	1st Feb., 1901. No. Packages.	Per Cent.	5th May, 1899. No. Packages.	Per Cent.	4th May, 1900. No. Packages.	Per Cent.	3rd May, 1901. No. Packages.	Per Cent.
10d and upwards. ...	3,329	3·94	2,434	9·62	3,566	7·33	1,230	2·40
9d to 9¾d. ...	5,616	6·64	3 400	13·44	3,511	7 22	2,507	4·90
8d to 8¾d. ..	9,148	10·82	9,412	37·19	6,219	12·78	5,580	10·91
7d to 7¾d. .	13,728	16·24	9,610	37 98	11,143	22 90	7,851	15·35
6d to 6¾d. ..	15,896	18·80	448	1·77	22,348	45·94	11 296	22·09
5¾d and under. ..	36,831	43·56	,,		1 864	3·83	22,682	44·35
	84,548	100·—	25,304	100·—	48,651	100·—	51,146	100·—

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop, August-September delivery 1901 : booking necessary before the end of April ; quantities of 100,000 and over at special low rates. Plants available all the year round. 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900:—"I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year."

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery, 1901, booking necessary before the end of March ; large quantities on special terms ; Plants in Wardian cases.

Manihot Glaziovii—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter, in sending an order for this seed, wrote on the 22nd August, 1900:—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Kickxia Elastica.—(*Funtumia Elastica*).—Seeds and Plants, orders booked. (Lagos rubber.)

Ficus Elastica.—Seeds available in May-June ; booking necessary before the end of March ; also plants.

Urceola Esculenta and **U. Elastica.**—Same as above. (Burma rubber.)

Parameria Glandulifera.—Orders booked for seeds for January-February delivery ; also plants; immediate booking necessary. (A good rubber creeper of Malacca.)

Landolphia Kirkii.—Seeds in July-August, early booking necessary. Plants can be supplied all the year round. (A highly-recommended species.)

Chonemorpha *Macrophylla*.—Seeds and Plants ; orders booked. (A very valuable rubber-yielding creeper.)

Memusops Globosa and **Payena Leerii.**—Seeds and plants in July-August, booking necessary before April.

Achras Sapota, Willughbeia Firma, W. Edulis and other **Rubber and Gutta Percha** yielding Trees and Creepers, Seeds and Plants.

Cinnamomum Zeylanicum (Cinnamon superior variety). New crop of seed in April to June, booking necessary before the end of February ; also plants.

Coffea Arabica, Liberian Hybrid and **Maragogipe Hybrid.**—New crop March-April ; immediate booking necessary.

Cinchona Ledgeriana.—Seeds now ready, also other varieties.

Seeds and Plants of Nutmeg, Clove, Sandalwood (white and red), Pepper, Cardamom, Vanilla, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, Eucalyptus various varieties, also Palms, Bulbs Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products of Foreign countries for 1901-1902, now being prepared, and will be ready in a few months.

"South Africa."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by William Brothers, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbling. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Price List of Seeds and Plants for Ceylon use, post free, on application.

Our new Descriptive Price Lists of Seeds of Shade Trees for Coffee, Cacao, Tea, Cardamoms &c., Timber Trees, Trees for Avenues, Hedges, Wind and Shelter Belts, Ornamental Trees, Shrubs and Climbing Plants ; and Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns. Crotons, Orchids, Bulbs, Dracænas, now being prepared, and will be ready shortly.

***Special* Arrangements** made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

Agents in London:—Messrs. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Telegraphic Address: William, Veyangoda, Ceylon. Lieber's, A.I. and A.B.C. Codes used.

J. P. WILLIAM & BROTHERS, *Tropical Seed Merchants*, Henaratgoda, Ceylon.

Correspondence.

To the Editor.

PLANTING IN NYASSALAND: B. C. AFRICA.

FRIGHTENED AGAINST PLANTING TEA: CHILLIES TO THE FRONT.

M'lanje, May 9.

DEAR SIR,—The prices Ceylon tea is now fetching frightens one from extending much here on that product. Over-production and low prices usually, in time, find a remedy. Low coffee prices and short crops in B. C. Africa are causing a great funk, and planters are going in for tobacco and chillies at a great rate. I hear of thousands of acres being put under the latter product.

Chillies may be over-done, but tobacco won't I am sure. I am getting 1s per pound, for all I can produce, in the South African market. --I cannot go in extensively for this product for want of a steady supply of labour. We have now got established a Labour Bureau which is doing good work, I have had thirty men sent down during the last month. There is labour galore in this country, but owing to the interference of Government Officials, and the unscrupulous recruiting by native kapatns belonging to Transport Companies and planters, the people are afraid to leave their homes. H. B

P. S.—So the Nyassaland Company is likely to close down, and I hear Lochnagar Estate is abandoned. It had bad treatment indeed.—H. B.

INTERESTING INFORMATION FROM PARIS IN RESPECT OF GUTTA PERCHA AND RUBBER.

Paris, May 25th.

DEAR SIR,—You will receive by this mail a little sample of Gutta Percha; submit it to any expert and he will report—' Gutta Percha fine quality.' And yet, I can certify that neither *Dichopsis, Palaquium, Isonandra, Payena*, nor any other plant yielding Gutta Percha has any thing to do with this sample.

This little sample is perhaps the solution of an urgent problem, the certitude of the supply of this substance for the future. All the Gutta Percha yielders from the "Insulande," * are localised, and the crop will be quickly exhausted. Their product is slowly obtained; the trees require four years and more and give 1 or 2 lb of marketable gum. The extraction from the leaves has proved till now a failure, and has not been accepted by the manufacturer of electric cables; extraction from the bark is on trial and I cannot say anything about it yet.

But chemists have recognised the presence of gutta percha in a number of plants growing in all parts of the tropical world. All the *Mimusops* contain Gutta; and *M Balata* and *M Globosa* are reported to yield 60 to 70 per cent of pure Gutta in the gum. *M Schimpen* of Abyssinia and very probably the species from Asia, contains a limited quanity of the product. I know that other *Sapotaceous* plants and a few *Euphorbiaceous* are in the same case. The sample I send you has been obtained from Balata, *Mimusops Balata*.

I do not know the process, but I knew it is a very simple and economical one. One kilo of Balata gives 700 grammes of Gutta. As the sample is valued at 7 francs per kilo, one can obtain 700 grammes of a substance easily sold at 14 francs for 700 grammes or 20 frs. per kilo. The chemist says that, all expenses paid, the kilo comes out at 12 to 12½ francs the kilo. This sample is sold here at a much higher price, for 30 francs have been paid in every case, so you can judge of the commercial value of the substance.

But just now I write with another point in view. I write only to planters, and I say all the gutta-yielders actually known are trees, slow-growing, requiring a special soil and climate, and very few will try the culture of these trees out of the regions where nature has sown *Dichopsis, Isonandra, &c.*,

But amongst the numerous species containing gutta, mixed with other substances, many are easy to propagate and to grow in very varied conditions of temperature, soil, and moisture. So it will be of enormous interest to know what percentage of Gutta all these plants contain, and to see beforehand if the culture can be remunerative. Till now the process has been a secret, but I believe it will not be so for long. But never mind, if this gutta-yielder becomes the subject of a great enterprise, Balata gum will jump high, so the grower will be interested in trying some other gutta-yielders. *Balata* (*Mimusops Balata*) is a tree more easily grown than *Isonandra* or others from the same region, and other sorts of Mimusops are largely spread over the world.

Any chemist will give you the percentage of true gutta the trees contain; do not take any notice if the chemist says it will be too expensive to isolate the gutta. My inventor says that his process allows him to make a profit from the gums containing only 10 per cent. of true gutta. But we will speak of that again some day or other.

I received a few days ago two plants in a very bad state from the centre of the Orenoque region. One of these plants has begun to show a few leaves and I was very ashamed when I identified it with the numerous varieties of *Sapium Biglandulosum* The travellers reported:—Big tree, yielding a large quantity of the rubber exported under the name of Para rubber. *

I know that Para rubber is not the product of *Hevea* alone, and an Englishman sent me a few years ago a sample of rubber made from *Micrandra*. But *Sapium* from the hot countries has always been reported to yield Rubber of very inferior quality. Strange to say, I have had in my hands plants collected by one of my collectors, M Guillot, from English Guiana, known by such an authority as Mr Jenmann as a bad yielder; others from Columbia, giving the virgin Caucho known as a very fine sort: others from Ecuador, just at the limit where the *Castilloa* is met: all these sorts are exactly the same in general appearance. But the area where *Sapium* gives good rubber is immense, nearly as large as its competitors, *Hevea* or *Castilloa*.

I have not been able till now to identify that new Rubber yielder from San Luiz Potosi, Mexico. I know that the plant is a very common one in all the dry countries of the Mexican region, but I

* *Sic.* What does our correspondent exactly mean by this?—ED. *T.A.*

do not know its botanical name. My correspondent told me that the plant was known under the name of *Synanthera prepennia*, but Synanthera is not the name of a botanical genus, so I believe this species has been determined as a plant of the Synanthera family, which will also be called part of the "compositæ" family. The sample I have had in hand is really a plant of this family, but I have not had any flower, so I can say nothing more. As the region where the plant grows presents many plants suitable for the dry countries of North Africa, it has great interest for us.

After many trials I have received in good order seeds of the *Mangiaba* rubber (*Ilencornia speciosa*). These reached me in the forests, packed in saw-dust, but I believe it will never pay to import the seeds. All insects are fond of these seeds, and I have been obliged to place the pots on supports with the feet of these supports in Lysol to avoid the incursions of ants. It is a common proceeding in your countries, but not here. The seeds begin to germinate in a few days. The plants remain very delicate in our houses, but are easily propagated by cuttings.

I trust some of your planters will be enterprising and kind enough to send me through you a few samples of the gum from *sapotaceous* plants from your fine country, and if possible latex from the same. The latter must be packed in bottles mixed with 2 per cent of formol.* I believe that will be sufficient for avoiding the coagulation of the latex, for I can do nothing with coagulated latex.—Truly yours A. GODEFROY LEBEUF.

[The following are the trees of the order *Sapotaceæ*, mentioned in Trimen's "Handbook of the Flora of Ceylon," of which the author says that 'all contain a milky juice, which, after evaporation of its liquid portion, affords that variety of Caoutchouc known as Gutta-percha:—(1) Chrysophyllum; (2) Sideroxylon; (3) Isonandra; (4) Bassia; (5) Palaquium and (6) Mimusops.—Ed. *T.A.*]

TEA SEED FROM NATAL.

AN INTERESTING HYBRID.

Ifafa, Alexandra County, Natal, May 28.

Dear Sir,—At the request of the late Mr. John Fraser, of Umzimkulu, formerly well-known to you as of the "Brae Group" of Gardens, Ceylon, I have taken the liberty of sending you, through Messrs. King and Sons of Durban, a small box of tea seed. Mr. Fraser had a quantity of the seed from me and mentioned that there would probably be an opening for seed in Ceylon, so pleased was he with the jât. All the seed on my place I have imported—some from Darjeeling, some from the Kodanaard (Nilgiris) and some from Ceylon (from a Mr. Inglis.) Consequently the seed I am sending you is a hybrid I shall take it as a great favor if you would kindly ask one of your friends to try the seed and let me know what you think of it. Our seed is ready for shipment February-April. Thanking you in anticipation, I beg to remain, yours truly,

JAS. A. McMILLAN.

[We will get the seed tried at once, but there is certainly no opening for tea seed in Ceylon!—Ed. *T.A.*]

* ? Ether or some acid.—Ed. *T.A.*

THE OLDEST TEA-TREE,

A SCOTTISH EX-PROPRIETOR'S CONFIRMATION.

Edinburgh, May 28.

Dear Sir,—A letter appears in your Overland issue of 9th May by Mr. Cottam from Pen-y-lan estate, headed "Have we found the oldest tea-tree?" I think so: for on reading the name "Llewellyn" and "Pen-y-lan," a dormant memory of the decade forty is awakened. I remember Mr. Llewellyn (senr.) visiting Captain Reddie at "The Eagle's Nest" bungalow on Karagastenne estate, somewhere in the middle of the "forty decade," and of his saying either that he was about to experiment in planting tea, or that he had done so on his estate in Dolosbage. The tea-tree mentioned by Mr. Cottam cannot be under 55 years old—probably more, if it could be found out in what year Mr. Llewellyn bought and settled on Pen-y-lan.—Yours truly,

P. D. MILLIE.

"TEA SEED OIL": MR. DRUMMOND DEANE'S LATEST EXPERIMENT.

Travancore, S. India, June 16.

Dear Sir,—I have read with interest the extracts you give of Mr. Thomas Christy's letter asking for information about Ceylon oils. Now I have been recently experimenting with tea seed oil, the seed taken from "China" and hybrid bushes, and am in correspondence with my London agents about it and am sending them a sample gallon of oil and also some of the poonac by next steamer from Cochin. The poonac when potash is added "lathers" freely and has the cleansing properties of soap. The oil is clear and not unlike olive oil; 1 lb. of clean seed gives, so far as my experiments go, ·20 lb. clean oil, but I think if the poonac were boiled and oil taken out, it would be quite ·25. Tea seed oil has been used in China from time immemorial for burning purposes; for light, it burns well and gives little smoke.

I am unaware that it has ever been tried as an article of commerce, but the yield in low jât fields if not pruned frequently is very large and possibly it might pay planters to abandon such fields for the purpose of converting the seed into oil. Next hot season I intend gathering off a field of low jât tea systematically, with the object of testing fully the cost of production.—I am, sir, yours faithfully,

H. DRUMMOND DEANE.

P.S.—Before reading your article I was in correspondence with "Indian Gardening" and the "I T.A." on this subject, and no doubt that paper will shortly have something to say about the matter, as I sent samples of oil and poonac for analysis. I am posting you a small bottle of ordinary oil. Some I have sent London is much clearer. Also a small piece of poonac in case you think it worth while to have them analysed for your readers' information.

H. D. D.

"ACACIA DECURRENS": AS A "NEW" PRODUCT FOR CEYLON.

Albion, Nuwara Eliya, June 20.

Dear Sir,—Your paragraph in *Observer* of 17th instant, *re acacia decurrens* as a possible new product for Ceylon, is likely to give anyone interested the impression that it has not yet had a trial. I first planted *acacia decurrens* here in 1887 on very ordinary patana soil, and there is no doubt as to its being a success, as I have marketed several tons of bark from a small belt, and during the past few years have sold (mostly locally), over 300 lb. of seed, the produce of my older trees; while a sample of bark that was sent to the last Paris Exhibition was awarded a medal. (The tree that produced it was raised from my own seed.) To make it a really paying concern it should be grown on a large scale for export, and if in a locality where the timber would command a sale (fuel), that item would add considerably to the profits. You might publish some of the detailed estimates given in Maidan's "Wattles and Wattlebarks;" and if a syndicate could be formed to take the matter up, Government might reasonably be asked to lease or grant free for a term of 10 or 12 years, a few thousand acres of the now useless patanas, not only in Uva but say beween Nanuoya and Summit Level. Mr. Thomas Kent "discovered" the virtues of mimosa bark extract and received as a reward (10,000) ten thousand acres of the richest land he could find in Tasmania.—Yours faithfully, A. J. KELLOW.

BASIC SUPERPHOSPHATE AND "HUGHES' PATENT."

London, June 21st, 1901.

Dear Sir,—The *Overland Observer* received this week contains a criticism on the above from a planter who, you state, "has paid a good deal of attention to the subject of the proper manure for tea."

It would be very out of place for me to occupy your space with a view to supporting the merits of a manure introduced by myself. Basic Superphosphate must succeed on its own merits, and it will be sufficient to mention that the material has been devised upon chemical principles in order to supply phosphate of lime in a readily available form, for application to soils naturally deficient in lime, upon which ordinary Acid Superphosphate, when used alone, cannot exert its full benefit.

The practical value of the invention has been recognised by the formation last January of a syndicate consisting of six of the largest manure firms in the United Kingdom who have taken up the patent rights, and the manure is now being prepared and sold in considerable quantities. Ceylon planters, who are shrewd men of business, will properly appreciate the above facts and I now proceed to briefly reply to the points of objection raised by the planter already referred to. He states that, unless Basic Superphosphate is cheaper than Basic Slag, he does not think there will be much sale for it in Ceylon. In reply I can assure him that this is no reason whatever, because the new manure is of superior solubility in regard to its composition and therefore should command a higher price per ton.

I quite agree with the planter that tea only requires Phosphoric Acid in comparatively small proportion, but it requires to get it in a form readily available as plant food, and not in the condition of a hard fused mass like slag, however finely the latter may be ground.

"Planter" rather contradicts himself in first stating that Tea only requires Phosphoric Acid as an essential ingredient to a moderate extent, and then going on to state that Basic Slag which contains fully 38 to 40 per cent of Phosphate of lime is more effective as a material for burying with prunings than even burnt and slaked lime which practically contains no Phosphate of lime *at all*.

The cost of Basic Superphosphate in England is about £2 10*s* per ton for the usual quality which contains 26 per cent of Phosphate of lime soluble in a weak solution of Citric Acid (1 in 1,000 parts of water.) For foreign shipment it has the great advantage over Acid Superphosphate that, being Alkaline in character, there is no danger of the bags being rotted during the voyage; and importers will fully appreciate what immunity from damage in that respect means.

"Planter" evidently recognises the value of the invention when he concludes his letter by remarking that concentrated Superphosphate of lime could be mixed with finely-slaked coral lime, and might be found a cheaper form for restoring the balance to crops which are annuals, but he adds, for Tea the problem is more complicated.

My patent consists in the conversion of Acid Superphosphate into alkaline or Basic Superphosphate by the use of lime, and I am not restricted to any particular strength or quality of the respective ingredients; so that the most concentrated Superphosphate can be treated with lime prior to shipment, and thus all the annoyance of damage, through the rotting of the bags during transit, will be avoided and the manure will arrive in a fine, dry, powdery condition admirably adapted for mixing with the other ingredients necessary to form a suitable complete compound fertiliser for Tea or Coffee.

I enclose you an official reprint of my paper read before the Society of Chemical Industry at Burlington House on April 1st, which also gives an account of the discussion which followed the same.

JOHN HUGHES,
Agricultural Analyst.

TEA SEED OIL.

AN ACCOUNT OF SOME EXPERIMENTS.

Mount Lavinia, June 22.

Dear Sir,—In answer to your request for some information regarding tea seed oil, perhaps the following notes may be useful:—

Some five years since, I experimented with this oil, which was extracted in two different ways:—(1) by pressing the seed in a "chekku" and (2) by boiling the seed, when the oil was removed by skimming the surface of the liquor. The first kind was like fine olive oil in appearance: and, according to the City Analyst, to whom I submitted samples, it was possessed of many of the latter's properties. It made an excellent illuminant, being in that respect fully equal to coconut oil: and was also very useful as a lubricant for machinery, being equal to the

best vegetable oils used for that purpose. I used it in the tea factory for some time, and gave samples to my neighbours, who spoke well of it. Tea seed oil has been used for centuries by the Chinese and Japanese for lighting, cooking and varnishing purposes. Our estate coolies use it for lighting and cooking, and also for anointing their bodies. The boiled oil gives a good stain and polish to wood work of all kinds, and would make a very fair varnish; and the poonac after the oil has been extracted from it would most probably make an excellent fertilizer for tea.

The raw oil is specially well suited for purposes of soap manufacture, and would in this respect undoubtedly rival coconut-oil, if it could be produced at the same cost. But here is the rub!—and I came to the conclusion, after going carefully into the question of production, etc., that, excepting perhaps upon land already abandoned (*i.e.* unweeded and uncultivated), it would not be harvested with profit. And even then the seed would inevitably deteriorate in quantity and quality as the bushes become gradually enveloped in new jungle growth. In South India the conditions may perhaps be different.

I published an account of my experiments in "Planting Opinion" for (I think) June or July 1896. but at present I am away from my notes. On my return to the estate, I will furnish Mr. Deane with a copy of Mr. Cochran's report.—Yours faithfully,

OLIVER COLLETT.

TEA-GROWING IN SOUTH CAROLINA.

To the Editor, *The Tropical Agriculturist.*

Office of Special Agent, Tea Culture, U.S, Dept. Agriculture, "Pinehurst," Summerville, S.C., June 6th, 1901.

Sir,—I note in the May No. of your ever-instructive and welcome journal your apparent surprise that the article written by Mrs. Ellis for the "Review of Reviews" did not allude "to the part played by an old Ceylon planter—Mr. Henry Cottam" in the local experimentation. Aside from the fact that the work was that of another, it is but justice to Mr. Cottam and myself to state that his visit to Pinehurst was most agreeable, inspiriting, and advantageous to me; although the first cold winter caused me to abandon, as unsuitable to this climate, the Ceylonese methods of cultivation of which, very naturally, Mr. Cottam was the enthusiastic exponent. And I might add that experience has demonstrated that it is better to conform to the taste of the buyer than to attempt to convert him.—Yours very truly, CHARLES U. SHEPARD.

MR. A. COOKE'S SCHEME FOR A TEA RESERVE

Watawala, July 8.

Dear Sir,—Referring to Mr. A Cooke's scheme—I see no reason why it should not be quite workable, with good agents in Calcutta and Colombo; provided that it receives sufficient support in India and Ceylon. Of course, there would be a tug of war, for some months after its inauguration, between the buyers and the Syndicate; and the side that holds on longest wins.—Yours faithfully, D. K.

SOURCES OF TIMBER SUPPLY ON THE NILGIRIS.

Sir,—A Forest Conservator in 1876 declared that, if forest conservancy on the Nilgiris was efficiently carried out and an adequate number of exotic trees, Australian gums and aca ias, planted, thousands of tons of timber would be available annually to send down the ghaut for locomotive purposes, sleepers, building, etc.; adding that *eucalyptus globulus*, though inferior to te k for the interior fitting of houses, is known to be a valuable building material and used in Australia for beams, joists, rafters, and in outdoor work for piers, bridges, fences, rails, railway sleepers and shafts and spokes, and other purposes. Twenty-five years have elapsed since this was said, and the sanguine expectations of this enthusiastic forest official remain unrealised, for no hill-grown timber finds its way down the ghaut and the Nilgiri Railway burns coal and refuses to depend for its sleepers on a local supply.

It was not so long ago either, that an indent for timber from Calicut could not be supplied from the Mudumallay forest for the reason that none was available.

Mudumallay, referred to, is a forest lying to the north-west of the Nilgiris on the Mysore frontier, extending from Tibbakadu northwards beyond the Mudumallay Hill, until it joins the Wainad teak hill. It is approximately 300 square miles in extent, of which 200 square miles have been leased by Government from the Tirumalaped of Nilambur, for 99 years, at a rental of rupees 3,500, beginning with the year 1862. Before that date a five years' lease existed of the same forest, from which the supply of teak for the construction of the Wellington barracks was drawn. This forest contains much teak and other timber, but is so remote that such timber really has little marketable value, except for the Nilgiri plateau and for Mysore, and communication with the former is by a ghaut of stiff gradient; and with the latter the road is some 80 miles in length.

The teak planted at Mudumallay by the Forest Department in 1868-69, is not promising—being too far away from the influence of the South-West Monsoon; in fact, experience has shown that teak planting in mountainous countries does not promise so well as when planted in rich valleys, though the mountain timber is regarded as superior to the produce of richer and moister soils.

There is another teak forest on the confines of the Nilgiri District, though strictly speaking no part of it, named Benne. It is 80 square miles in extent, and the property of Government, very similar to Mudumallay in contents, but more exposed to the South-West Monsoon, for which reason its growth of teak is judged to be finer.

Barring the above, there are really no indigenous timber forests on the Nilgiris. Officially planted Australian gums and acacias amount to something like 1 000 acres in extent—but they have no appreciable effect on the house building of the plateau, where the gum is found to be too stringy and wanting in durability—though I have heard the District Board Engineer say that a

timber bridge of blue gum piers that had stood in the water for 15 or 20 years were found on lifting to be as sound as when put down. This, however, has not been the experience of others, and the fact remains that no one who can afford teak or vengay will build with blue gum.

The 1,000 acres of planted blue gum and acacia above mentioned are in 21 plantations, but beyond using these plantations for fuel the Forest Department has no demand for their growths Most of them are not more than 20 years old, and this may be a reason why the capability of the exotics are not known and appreciated.

Of the blue gum—the Forest authority above quoted says that from measurements made he can state that 25 tons of dry timber per acre per annum are sure of being returned,—but a proviso is added that the growths in most if not all the plantations are very uneven and variable—mere spindlings being interspersed with trees of 2 and 2½ feet diameter.

The 21 plantations are seattered over a wide area,—and are in some instances 20 miles apart, so that every aspect and soil has been tried.

Private owners have done a great deal in the way of growing blue gums, but no single planter that I know of will admit that he is growing the tree for timber, all being satisfied with it for fuel, and more particularly for shelter, for which latter purpose it is admirably adapted.

I was told the other day by the Forest Officer of the Nilgiris, that the unrestricted growth of blue gum was seriously menacing the water-supply of the district, and thus stultifying the purpose for which conservancy was being carried out. That purpose will be understood when I tell you that, at present, no less than 369 square miles of forest are close reserves, and proposals are now under consideration to add 5 or 6 more square miles to the area. The proportion thus represented in a small district of only 957 square miles, with 124 square miles of unculturable waste, is simply unprecedented. The only benefit this officer claims for such wholesale reservation is the alleged regularity and abundance of the waterflow in the Cauvery River. But as this river has two other confluents, one from Coorg and the other from the Annamalais—it is hardly fair for the Nilgiri Forest Officer to take all the credit—even if the water-supply in the Cauvery River has been as he claims it to be. The late scarcity and drought in the Southern Presidency was attributed to the deficiency of irrigation water—then how can the river flow be what is claimed for it?

A. M. I. C. E.

—*Indian Engineering*, June 22.

THE TEA OVERPRODUCTION QUSSTION:

MR. A. COOKE OF CHOTA NAGPORE ON WHAT IS BEST TO BE DONE;

A BOLD SCHEME FOR TEA GROWERS;

HIS PAST ADVICE IN RESPECT OF AMERICA.

Dear Sir,—In the pages of "Indian Gardening and Planting" I proposed a scheme for the use of the Cess: at that time (April) there had been such strong recommendations for a Cess from the majority of those who spoke at public meetings that it appeared a certainty.

But as week followed week and nothing was done, I continued my exertions to get a Cess, and acting under advice I confined my endeavours to rousing the tea public to vote for the Cess. My friends said that we must first catch the Cess before we cook it. It is different in Ceylon. You have a Cess, and are open to receive proposals for the use of it, and so perhaps your planters will receive my idea without scoffing. I strongly hold the doctrine that an absolute reduction of yield would be fatal, but that the prices of tea at the open sales could be raised by withdrawing the *surplus*; that is to say if the buyers want 1,000 pounds or maunds, or tons, and 1,100 are offered, prices will be low; but if the surplus of 100 *can be* withdrawn the buyers will *have* to pay the price we want.

Some time ago your planters offered to reduce the yield by three million lb. and my advice is to *make* that three million, but withdraw it as required by the rates ruling at the sales. If prices are extremely low it might be necessary to withdraw 20 % from each sale for three or four successive sales, and as prices improved the amount to be withdrawn would become less until absolute equilibrium should be established. "Equilibrium" means a price which would pay for production and *also* for selling, the producer and buyer would both get their *legitimate* profits.

I may note here that a *reserve* of tea would enable us to fill up any temporary deficiency which otherwise would force the buyer to pay a price that left him no margin of profit.

Any sensible scheme *must* protect the interests of the buyer.

To return to the promised reduction of offerings, I proposed that the tea should be made, but the cost of making it would have to be *repaid* to those who join the scheme.

The cost of making tea in India, *i. e.* plucking, manufacture, fuel, boxes, freight to Calcutta and sale charges, comes to about R12½ per maund of 80 lbs, *i e.* 2½ annas per pound of Tea. *

I advised Indian Planters to put on a Cess of 2 pies per pound which would give a revenue of from 19 to 20 lakhs of rupees; the cost of 10 million lbs of tea at 2½ annas comes to about 15½ lakhs, and leaves 3½ to 4½ lakhs for expenses of distribution. I recommended that percentage of tea should be drawn from the sales of each class of tea, not only the lowest, but of *all* classes. Thus according to the orders for the amount of tea to be withdrawn, each garden would reserve one out of 20 or one out of 30 or 40 chests of *each* class of tea. This reserve could be forwarded on demand to the Association for disposal, and would be paid for at 2½ annas per pound out of the Cess.

The tea thus reserved would be credited to the garden at the prices actually obtained at the sale for the unreserved tea.

The reserved tea would be sent to new markets and disposed of.

If it is *given* away, there would be no return, but supposing it to be sold at 2½ annas, clear of all expenses, that sum would be refunded to the gardens.

By this means a certain proportion would refund the cost of the Cess itself. The Cess on 1,000 pounds at 2 pies comes to R10/6/0. 66 lb of tea at 2½ annas is also R10/6/0, and 66 is about 5½ per cent of 1,000, so that 5½ per cent of tea reserved and sold at 2½ annas would recover the cost of the Cess at 2 pies per pound on the whole crop. There is an old saying that

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* Fifteen cents per lb., to which cost of cultivation has to be added.—Ed. *T.A.*

you get nothing for nothing and very little for a ha'penny. Apparently I want to propose that the Cess shall pay itself and thus cost nothing. But in this case we gain by *unity* and efficiency. The mere fact of union amongst tea owners with a *sufficient* capital at their backs, will, to begin with, force the buyers to pay the Cess. The *first* two pies increase in prices will pay for the Cess. That sum of money, instead of being distributed amongst the producers, will be collected for the *general* good. It will buy *average* tea which will be sent forward to create a demand. When you *give* your surplus to the dealers they reserve the best tea for their ordinary customers, and they send forward the lowest classes to create a demand.

I have thus shown that, by *pretending* to pay a Cess of two pies per pound, we shall force the buyers to pay it, and we shall be able to extend our markets with *average* tea at cost price instead of with low-class rubbish at double that price.

Our *average* tea will be placed on new markets at 2½ annas at Calcutta, say 3½ annas anywhere in the world, and the present low-class tea bought in Calcutta at 2 annas is placed on those markets at about 4 to 5 annas. Does it not follow that better tea at half price would do more to create a demand than worse tea at double the price?

To put it in a clearer light, we could transfer the profit from the buyer in Calcutta or London to the pockets of the actual tea dealer in the new market; and he, having placed the new tea at a big profit, would go to Calcutta or London and get more of it.

In armed conflicts the one who can *show* overwhelming force is not compelled to *use* it; it is only necessary to send a commissioner or two to take possession of the desired territory.

In our case we can show an overwhelming force by paying a cess of 2 pies per pound *on the first few invoices of tea*, and we compel the buyer to refund that, and to go on paying this heavy cess, which we use in recovering that territory which the force of circumstances has made over to him. We shall recover the two annas per pound of tea which we do *not* get now, and which is *due* to us, and which the buyer and consumer have taken from us.

I have provided for the greatest difficulty, which is the *storage* of the reserved tea, by proposing that the reserves shall be kept (sealed) on the gardens till required. We can expect so much loyalty from managers that they will *honestly* reserve the tea, and not fill up the chests with bad tea or sand.

Even if all is granted there will be a minority who will refuse to reserve any tea. They will benefit by selling their *whole* crop at the improved rates. The *only* method of preventing this illicit gain would be to impose a Cess at a rate that would cover the gain in prices, and to refund the surplus funds to those who subscribed to any generally approved movement, but this of course is not practicable.

I fear that I exhibit a daring which may be considered folly in lightly mentioning sums of 20 lakhs of rupees per annum, but I have endeavoured to show that we shall *not actually have to pay it* ourselves, and these sums are small compared with the amount of gain to be obtained.

Our Indian crop, when it reaches 190 millions, at one anna per pound represents 118¾ lakhs of rupees, and an actual expenditure of 20 lakhs would be cheap for such a return. And then I have stated that we shall be able to recover *two* annas per pound, which comes to 237½ lakhs.

You in Ceylon spend about two to three lakhs of rupees per annum, and you do *not* get the buyers to pay it, because India has no Cess and the prices cannot be *forced* up. Let us suppose that you get a return of 200 per cent. on your expenditure, that is to say, you profit to the extent of 20 or 30 lakhs of rupees; that is real good business, but what is the use of this paltry profit divided amongst all tea owners?

It seems to me to be useless to struggle unless we, the tea makers, get the absolute command of the situation, and I reckon that 20 lakhs in India and 14 to 15 in Ceylon would effect this.

Unlike the simile used above, we send an insufficient force to capture the desired territory, and that force is cut up, and we remain vanquished; we remain the absolute slaves of the buyers. They will allow us only sufficient food to keep us alive.

By using ten times our present force we *shall* conquer and make up for lost time, and the tea world will belong to us; and China and Japan will retire into their own borders.

This scheme of mine surpasses even Mr. Mackenzie's aspirations. You could let him handle millions of pounds of *good* tea. Several years ago I ("1874") advised you to make "Green Tea," and to send big lots of tea to America to sell for what they would fetch; but Mr Mackenzie would not dare to be years ahead of his time.

I understand that your Associations are feeling sore with him, but in point of fact you set him to an impossible task; you wanted to get a return of one anna per pound on your tea for an expenditure of two lakhs of rupees.—Yours,

A. COOKE.

Gutta Percha and Rubber.—There can be no doubt that in these we have two products, the demand for which is bound to go on increasing for many years; while it is very doubtful if the present supply from the natural forests of South America, Africa, the Malayan archipelago and India can be maintained. Planters in suitable regions are bound more and more to study all available information about Rubber, &c., and to go in for the cultivation as far as possible. In this connection we call attention to an interesting suggestive letter from our correspondent, Mr. Godefroy-Lebœuf, of Paris, accompanied by a very fine sample of raw gutta percha, due to some process not yet generally known, although the tree is a well known one in the Straits. In other respects, the information of our correspondent is interesting, as when he speaks of rubber-yielding trees suitable to a dry climate and soil, such as prevails in Algiers and Tunis, and which might therefore be of service in Northern Ceylon. We hope to hear more on this subject. A great deal of information respecting *Mimusops balata* is given in our Manual, "All about Rubber." As to gutta-yielding trees, we fear there are few in Ceylon—none yet grown by planters (?) we believe—though the late Dr. Trimen did much to promote the growth of the best (*Dichopsis gutta*) in the Peradeniya and Henaratgoda Gardens. We should be glad to have any sample of "gum" or "latex" to send to our correspondent in Paris.

PLANTING NOTES.

Getting Rid of Couch Grass.—The following method is reported to be entirely successful:—Plough during midsummer, and keep couch from getting much headway by occasional harrowing during autumn months. Cross-plough in spring, harrow thoroughly, and sow some strong-growing crop in drills. Hoe constantly until crop is mature. Then repeat first year's proceedings. At the close of the second year not a vestige of couch will remain. —*Agricultural Gazette of New South Wales.*

Coconuts.—The question has recently been raised as to the largest number of nuts of all sizes which a coco palm can have on it at one time? Some one mentions 500 to 700; but we are inclined to think this too much. Has any one ever taken the trouble to count?—Then again, what was the largest number ever got at one plucking from a single tree? At Zanzibar we see that in one case, where quarterly pluckings were observed, over 100 nuts (110 in one case) were got from several trees. Is that unusual?

Timber on the Nilgiris.—Some interesting notes on the timber supply of the Nilgiris appear in our daily and *T. A.* It is pointed out that the exotics, Australian gums and acacias, though extensively planted, are not held in much favour for timber, but are rather grown for fuel and shelter. Wood for timber is usually drawn from the teak forests of the Nilgiris. A drawback to gums and acacias is their great capacity for the exhaustion of moisture.

Royal Horticultural Society: Orchids.—The fortnightly show of the Royal Horticultural Society was held yesterday at the Drill hall, James-street, Westminster. The orchids made a beautiful show, and nearly every collection included numerous specimens of Cattleya Mossiæ. Sir F Wigan sent a group which contained some fine Miltonias, with a few Masdevallias, a pretty example of Sobralia macrantha alba, white with a tinge of yellow in the throat, and two plants of the Thunia Marshalliana, bearing white blooms with variegated hairy lips, on the top of flag-like foliage. Messrs. Veitch and Sons' group included three Oncidiums of the divaricatum variety, having long sprays of small yellow flowers. Among the orchids staged by Mr J Colman, of Gatton-park, Reigate, there was a well-grown Cymbidium and many excellent Odontoglossums. Mr H Smee, of the Grange, Hackbridge, and Messrs. H. Sow and Co. exhibited some handsome Cattleyas. Mr H T Pitt's collection included a splendid Odontoglossum Crispum Pittianum, well marked with brown blotches on white; Messrs. Stanley, Ashton, and Co. sent a large variety, one of the orchids which took an award of merit being a pretty Cattleya Mossiæ of the "Mrs F W Ashton" variety, which had white petals, prettily crimpled lip, with very light crimson-purple markings, and a rim of yellow round the middle of the lobe; and Mr H F Simmonds, of Beckenham, staged a beautiful group. All the above exhibitors were awarded medals, and Mr R H Murray, of Great Marlow, received "cultural commendation" for a grand plant of Dendrobium thyrsiflorum. Among the miscellaneous groups there were several charming displays of hardy flowers.—London *Times*, June 5th.

Gamboge Fruits.—Mr. Gutteridge, the Curator of the Liverpool Botanic Gardens, obligingly sends us fruits of the tree yielding the gum known as Gamboge. We do not remember to have seen them previously. They are globose, the size of a small Apple or Diospyros kaki, and of a yellow colour. We may allude to them on a future occasion.—*Gardeners' Chronicle*, May 25.

Coffee in Costa Rica—is the subject of a second contribution in our daily and *T.A.* from a planter who owes his birth if not his training to Ceylon and who has a good deal to tell us about the mode of working in the Central American Republic; but strange to say, as our note to the letter mentions, nothing is said about Cacao which we understand to be a great crop in Costa Rica for local consumption.

Tea Seed Oil.—Mr Drummond Deane's letter elsewhere opens up a happy vista for the proprietor with abandoned, or anything but paying tea fields. Tea seed oil may figure in our Chamber of Commerce exports by this time two years hence! But we have first to await the result of the experiments Mr. Deane is making, unless any planters in Ceylon will experiment for themselves. We shall be glad, if so, to hear of their results.

A Coffee Exchange in Rio de Janeiro.—It is proposed to establish a Coffee Exchange in Rio de Janeiro, with branches and depôts in Santos, Bahia and Victoria. A petition has already been made to the President of the Republic. This Exchange is to be managed by seven directors to be chosen by parties interested in the trade, except the chairman, who is to be nominated by the Government. It is also proposed to establish agencies to furnish statistics of the production and consumption of coffee, in order to establish a basis for arranging the prices.—*Handel's Museum.*

Overproduction and the Function of Government.—There is a curious remark in a recent London market Report in reference to the Overproduction of Brazilian Coffee which we do not think has been noticed locally. The writer says:—

"In December last, the popular figure was 9,500,000 bags receipts for the season, today 10,500,000 bags is likely to be nearer the mark. Another object lesson is that, even half way through a crop, estimates are anything but infallible. It is curious that, whilst modern Governments can take away from the individual in money, for the benefit of himself and his country, they cannot take away from him in kind, for the same benevolent purpose. We hear of Government bounties to stimulate production, but we never hear of Government action to check the same. If the Brazilian Government were to destroy a percentage of the Brazilian Coffee Planters' production, the individual and the Government would benefit, and why, if it be wise to stimulate, it should be foolish to check, we cannot understand."

This has reference to the fact that the current season's Brazil Coffee Crop—or rather Rio and Santos exports—are to reach 11 to 12 million bags, whereas the world (according to W H Crossman & Brothers) only wants 8¼ million bags of "Rio and Santos."

THE DUMONT COFFEE CO., LTD.

Directors in London.—P R Buchanan (Chairman), H K Rutherford, Hon. H A Lawrence, G A Talbot, R Hart, and S Boulnois.

Directors in Brazil.—John Buchanan and Senhor Rodolfo Miranda.

Auditors.— Messrs. Jackson, Pixley, Browning, Husey & Co.

Secretaries and Managing Agents.—Messrs. P R Buchanan & Co.

Offices.—45, Leadenhall Street, London, E.C.

Report to be presented at the Fifth Annual General Meeting of the Dumont Coffee Company, Limited, to be held at Winchester House, Old Broad Street, London, E.C., on Monday, the 24th day of June, 1901, at 12 noon. The Directors submit the General Balance Sheet and Profit and Loss Account for the year ending 31st December, 1900.

The Gross Profit for the year, exclusive of £7,097 12s 8d brought forward from previous year, amounted to ...		£58,495
And the London Charges were ...		3,340
Leaving a Nett Profit of		£55,155
Amount brought forward from 1899 ...		7,098
		£62,253
Interest at 5½ per cent. per annum (less Income Tax) has been paid on the Debentures, amounting to ...	£20,981	
Income Tax on same ...	1,008	
A payment of 2½ per cent. (less Income Tax) was made on 19th April, 1901, on account of arrears of Dividend on the Preference Shares ...	9,500	
Income Tax on same ...	500	
		31,989
Leaving a balance of		£30,264
It is proposed to place to a Reserve Account		20,000
And to carry forward a balance of ...		£10,264

The Crop, which was estimated at 75,000 cwt., amounted to 81,781 cwt. Of this quantity, 70,478 cwt. were sold in London, and the remainder in Santos and New York.

The gross average price realised for the whole crop was equivalent to 40/2 per cwt. landed in London, as against 29/4½ per cwt. the previous year, but owing to the adverse milreis Exchange the cost in London was 6/10 per cwt. more than in 1899.

The spot price of "good average Santos Coffee," during the period of the year in which the Company's crop was sold, was 35/8 per cwt., while the average price realised for the Company's pulped Coffee, of which there were 22,760 cwts., was 47/7, and for the Company's unpulped Coffee 37/4 per cwt.

Owing to the increased production of Coffee from Brazil during the year under review, the price of ordinary Santos Coffee has now fallen to 29/ per cwt., and with the Exchange at about 11½d per milreis, the margin of profit is considerably diminished, causing the position of growers to be one of anxiety at the present time.

Under these circumstances, and in view of the necessity of providing working capital, the Directors, after serious consideration, do not feel justified in recommending the distribution of any further dividend, but consider it prudent to place the sum of £20,000 to Reserve Account, carrying forward £10,263 15s 7d.

With regard to the condition of the Estate and of crop prospects, the Manager writes, under date the 8th April:—

"General Appearance of Property.—This continues most satisfactory, and there is lots of wood to give another good crop in 1902. I suppose that Bourbon Coffee at Agua Vermelha and Paty will give less, as it seems only to yield well every second year, but all the old Coffee looks as well as ever it did, and the young fields at Guerra, Igaape, and Paty have very much improved and ought to bear well next year."

The Coffee crop harvested to 31st ultimo was 38,000 cwts,, as against 23,300 cwts. to same date last year, and the Manager's latest estimate of the current crop is 120,000 cwts.

Mr. R Hart and Hon. H A Lawrence are the retiring Directors, and, being eligible, offer themselves for re-election.

The Auditors, Messrs. Jackson, Pixley, Browning, Husey & Co., also retire, and again offer themselves for re-election.—By order of the Board, P. R Buchanan & Co., Secretaries.

12th June, 1901.

PITIAGAMA CINCHONA COMPANY.

Minutes of general meeting held at No, 11 Queen Street, Colombo, at 12 noon on Saturday the 29th June, 1901.

Present.—Messrs S Bois, H G Bois and C E H Symons.

Minutes of last general meeting were read and confirmed.

Notice convening the meeting was read.

Proposed by Mr H G Bois and seconded by Mr C E H Symons :—That the Report and accounts for the 13 months ending 31st January 1901 be adopted.—Carried.

Proposed by Mr C E H Symons and seconded by Mr F W Bois' attorney :—That Mr Stanley Bois be re-elected Director.

Proposed by Mr. C. E. H. Symons and seconded by Miss W. Cross Buchanan's attorney, that Mr. E. M. Shattock be re-appointed auditor on a fee not exceeding R50.

The report was as follows:—

The Directors herewith beg to submit their Report and Balance Sheet for the thirteen months ended 31st January, 1901.

The total quantity of Tea manufactured during the period under review amounted to 106,948 lb., of which 101,195 lb. was secured during the twelve months to 31st December last, against an estimate of 77,000 lb ; the average price per lb. realised being cents. 33·02, against cents 38·33 in 1899.

The Directors have to point out that the amount of R23,206·68 appearing in last year's account as in suspense has been transferred, which accounts for the balance of the Profit and Loss Account (viz., R27,765 64, as will be seen from the accounts) being so considerably in excess of that for the year 1899.

As previously intimated to the Shareholders, the estate has now been leased for a term of ten years, with the option to the Lessee of discontinuing same after the expiry of seven years as from the 1st February, 1901.

The Lessee is to have the option of purchase at any time during the currency of the lease for the sum of £7,000—less £500 to be spent by him in putting the Estate and Factory into good working order—*i.e.*, for £6,500 sterling nett.

Mr Stanley Bois retires from the board, but is eligible for re-election.

The appointment of an Auditor for the current year rests with the meeting.

THE BOGAWANTALAWA DISTRICT TEA COMPANY, LIMITED.

ANNUAL REPORT.

The Directors have the pleasure to submit the Balance Sheet and Accounts of the Company for the year ending 31st March 1901, duly audited.

The yield of Tea largely exceeded the estimate in spite of finer plucking during the last three months of the season, and the cost of production, though slightly higher than last year, is still moderate. The average price obtained for the Tea is again lower, owing to the unsatisfactory state of the market during the year. The expenditure includes that incurred on New Clearings, Buildings, and Machinery.

The total yield was 1,236,272 lb. Tea plucked off 2,185 acres, being at the rate of 565 lb. per acre all round, costing free on board at Colombo 23·92 cents or 3·93d per lb. The gross average price of the 1,220,246 lb. sold in London was 7·51 per lb.

The crops for the current season owing to finer plucking are estimated at 1,188,000 lb. tea.

The gross average at which drafts were negociated was 1s 4½d per Rupee against 1s 4 5-16d in the previous season.

The Directors desire to place on record their appreciation of the services of their Manager and his staff in Ceylon.

STATEMENT SHEWING RESULTS OF WORKING FOR THE FOUR YEARS ENDING 31ST MARCH, 1901.

Season.	Acreage Plucked.	Total Tea Crop.	Yield per acre.	Cost of Crop per lb. f.o.b. Colombo.	Gross Average per lb. Tea sold in London.	Average Rate of Exchange per Rupee.	Dividends Preference.	Dividends Ordinary.
	Acres.	lb.	lb.	d.	d.			
1897-98	2,041	994,413	487	4·22	8·20	1/3 9-16	6	6
1898-99	2,081	1,031,782	495	4·12	8·71	1/4 5-32	6	7½
1899-00	2,185	1,209,451	553	3·69	7·98	1/4 5-16	6	7½
1900-91	2,185	1,236,272	565	3·93	7·51	1/4¼	6	6

The Profit for the year amounts to	£13,290 5 11	
To which has to be added Interest ...	132 7 11	
And the Balance from last year of ..	952 10 5	
		£14,375 4 3
Interest on the Mortgage Debentures has been paid, *less* Income Tax ..	399 0 0	
Dividends on the 6 per cent. Preference Shares for the 12 months were paid on the 3rd October 1900, and 3rd April 1901, *less* Tax ..	5,301 0 0	
An Interim Dividend of 1½ per cent. on the Ordinary Shares was paid, *less* Tax, on the 9th January, 1901 ...	1,425 0 0	
Income Tax to April 1901 has been paid ..	722 2 0	
It is Proposed—		
To pay a final Dividend of 4½ per cent. on the Ordinary Shares, making 6 per cent. for the year, which will require, *less* Tax, ..	4,275 0 0	
To transfer to Reserve (increasing this account to £4,500) ...	1,500 0 0	
And to carry forward to next year the balance of ..	753 2 3	
		£14,375 4 3

The Director retiring on this occasion is Mr Charles Fetherstonhaugh and, being eligible, he offers himself for re-election.

Mr. John Smith, the Auditor, also retires and offer himself for re-election.

By Order of the Board, ROBERTSON, BOIS & Co., Agents and Secretaries.

12, Fenchurch Street, London, E.C., 18th June, 1901.

SCHEDULE OF THE COMPANY'S ESTATES.

Estates.	Tea, full bearing.	Tea, not in bearing.	Forest.	Grass.	Chena and Patana.	Total.
Kirkoswald	756	35	74	12	—	877
Bridwell	382	36	35	5	15	473
Elbedde	705	—	27	15	—	747
Bogawana	342	26	44	6	18	436
Total	2,185	97	180	38	33	2,533 acres.

PLANTING NOTES.

Ottery Tea Company.—This Company will be wound up shortly and the purchasers of the property of the Company ought to make a good bargain.

Green Teas.—We call attention to the weekly report of Messrs. Walker, Lambe & Co. on another page. The quantity of Ceylon green teas sent is said to have been so insignificant as not to make it worth buyers' while to attend to it.

A Biological Station for Ceylon.—Referring to the appointment of Professor Herdman to report on the Pearl Fisheries of Ceylon, unofficially announced by us, Mr. Collett looks forward to its consummation in that it will probably lead to the establishment of a Biological station for the island, whither students will come from all parts of the world, a station such as is found at Naples today. Fees from such students, it was pointed out to us, would go a good way towards paying for the expense of the station.

"Acacia Decurrens."—We have pleasure in publishing today the letter sent us by Mr. A. J. Kellow of Albion estate Nuwara-Eliya, giving his experience of growing "acacia decurrens." His experiment has been attended with undoubted success, and he thinks the cultivation of this plant could be made a really paying concern if it were carried out on a large scale for the purpose of export. This could be done by a syndicate and the reasonable suggestion is made that Government might be asked to lease or grant a few thousand acres of the patnas in Uva and between Nanuoya and Summit Level.

Manuring Bananas.—Mr R H Elworthy, of Priestman's River, took 5 acres of his coast lands in Portland, red soil which, he states, does not grow bananas ; he manured one acre with sheep manure and on this acre the bananas made luxuriant growth, and came in earliest, but bore small bunches of seven and eight hands. On one acre rotten coconut husks were dug in, and here the fruit came slow, with less stem and head growth than the acre with sheep manure, but the bunches were larger and fairly good on the whole. On the remaining three acres no manure was applied, and the bananas grew very poorly, producing, when they produced fruit at all, small bunches and poor fruit.—*Journal of the Dept. of Agriculture of Western Australia* for June.

ADVERTISING TEA.—Mr. P. C. Larkin's letter to Mr. Mackenzie provides very sound reading and his battle-cry, "advertise," is well spoken. As to the progress of Greens in the West, it rests with the planters, as Mr. Larkin says. But for pushing *black* teas Mr. Larkin's argument applies equally, except in so far as an established taste has to be changed, and it is only wholesale advertising, thus getting at the consumer, that will make a way for Ceylon black teas in America.

"BASIC SUPERPHOSPHATE."—We direct attention to Mr. John Hughes' reply to the criticism which has appeared in our columns. The contents of the accompanying pamphlet, we shall give in our *Tropical Agricuturist*, more particularly because the discussion—where Mr. Hughes' views met with a good deal of criticism, though on the whole he carried the experts present with him,—is exceptionally interesting. It is curious to read that "some years ago (Mr. D. A. Louis, a pupil in Rothamstead Laboratory, is speaking) "Dr. Augustus Voelcker, Sir John Lawes and Sir Henry Gilbert all set their faces against basic slag and considered it absolutely valueless." Again, later on, Dr. John Voelcker considered it worthless. The latter afterwards pointed out that the basic slag as now used was a very different body from the slag that was first introduced.—But all the same, we infer from the discussion that the first agricultural chemists of the age were mistaken at first as to the future before basic slag—and why not possibly in some other matters? We live to learn.

THE INDIAN TEA ASSOCIATION IN CALcutta—is inclined to be bitter against the Ceylon Planters or their Association for reasons which will be found in their proceedings given elsewhere. If we could only have foreseen war and a war-tax in 1898, doubtless the course taken in Ceylon that year in regard to the Tea Duty would have been very different.—On the other hand we have been urging the Indian Tea Association and planters for half-a-dozen years back to establish a "Tea Cess" after the example of Ceylon; and only now do they realise the necessity and importance; and yet, still, we may ask, where is the Memorial to the Viceroy, signed by every Tea or Planters' Association Chairman and Secretary—or better still by every planter—in India? Instead of a move of this kind, all the planters' energy seems to be spent in writing to the press, and we have even appeals to us in Ceylon, to help them to get a Tea Cess! So strongly do we feel in the matter that we would have our P.A last year to ask the Governor of Ceylon to mention the importance of the matter to Lord Curzon; but there is a certain degree of local jealousy; and it is far more important that the Indian Tea Planters should memorialise on their own account. Cannot so prolific a writer as "A.C." draft a brief pithy Memorial of half-a-dozen paragraphs at most? Then, if such were approved in Calcutta, printed and circulated with sheets for signature, the whole business could be done in a month or so.

MIDLANDS RAMIE SPINNING CO, LTD.—Registered June 13th, with a capital of £10,000, in £1 shares, to adopt an agreement with E A Wallis and W Watson, to acquire any patents, inventions, and the like, and to carry on the business of ramie manufacturers, growers and merchants, etc. No initial public issue. The number of directors is not to be less than 2 nor more than 5; the subscribers are to appoint the first qualification, £100; remuneration as fixed by the company. Registered by Fullilove & Co., 120, Cannon St E C.

COFFEE IN BRAZIL.—In his message to the Congress of the State of S. Paulo, the President refers to "the financial crisis through which the whole country is passing aggravated by the low price of coffee." He shows that, in 1892, 245½ millions of kilograms of coffee shipped were officially valued at close on 252 million dollars; and, in 1900, about 267 millions only was the value of as much as 387 million kilograms! He then goes on:—

Undoubtedly other coffee-producing countries will likewise feel the fall and have to contend with difficulties as great as ours. Planters in Java and Sumatra already complain of the damage inflicted by the over-production of this country and maintain that the future of coffee will be everywhere controlled by conditions here. In Mexico, the West Indies and Central America complaints are also heard that coffee is no longer profitable in consequence of our competition. After spending so much labour and money on raising the coffee industry to its present proportions, it would be a tremendous mistake to abandon the struggle when the exceptionally favourable conditions and the fertility of our soil and the tenacity of our planters are the most certain guarantee of ultimate success. If coffee cultivation has to be abandoned anywhere, it will not be in S. Paulo, where the conditions of resistance aro better than anywhere else!

What is wanted is that planters, merchants and Government should work all together and harmoniously, for the common end and give no attention to fanciful measures that can effect no real remedy and only make things worse.

To cut down working expenses, improve their process and secure permanent and steady labour. should be the aim of planters thus imitating the example of countries where production is far more insignificant, but better prices are secured by better products. On the side of *commissarios*, they should aim at extending old markets and opening new ones as well as at organising local elements of resistance to speculation, and the elimination of useless middlemen and consequent reduction of commission and direct dealing with consumers. The Santos market, important as it is, is now too narrow for operations so vast and branches of several exporting houses have, we are informed, been already started in America and Europe, whilst a few planters have commenced selling direct to consumers with good results. Energy and agitation cannot fail to produce good results for planters, if persisted in. By *Le Brésil* I observe that during the last few days a new house for exclusive sale of São Paulo coffees was opened in Paris by Snr. Concciçao, with the object of promoting consumption and raising the reputation of Brazilian coffees so unjustly depreciated by retailers.

The responsibility of the government, deriving as it does nearly all its revenue from coffee, cannot and has not been overlooked. By promoting immigration, improving the means of transport, reducing railway charges, funding agricultural schools and encouraging mortgage banks and other cognate measures, the government has already done much to benefit the planting interest.

There is much here that is applicable to planters, merchants and the Government in Ceylon in reference to tea.

IMPROVED AGRICULTURE FOR THE PRESENT AND NEXT GENERATION.

SCHOOL GARDENS AND THE SINHALESE AND TAMILS:

A KACHCHERI EXPERIMENTAL GARDEN IN EVERY REVENUE DISTRICT.

The Director of the Royal Botanic Gardens, in his lecture on Thursday the 13th inst., laid a sound foundation for all agricultural instruction and training with reference to the rising generation of Ceylonese. The educing (educating) and training of the powers of observation among young people has long been recognised as of much greater importance than the "cramming" with facts, whether of grammar, geography or history or the learning of lessons "by heart"; and it has also been recognised that no branch of study is better fitted to educe and train the observing power of children than "botany"—the study of plants. In this connection we may say there is immense encouragement in dealing with oriental pupils, at any rate in rural districts; from the simple fact that all Sinhalese and Tamil villagers, as a rule, know a great deal more about the plants and vegetables around them, and their various uses, than do the same class of people in the United Kingdom or perhaps anywhere in Europe, save in France where the peasantry cultivate a very close and practical acquaintance with nearly every plant within their reach. Dependent, as the rural Ceylonese are, on the products of the soil for their food and medicine, they know far more in their own way regarding a great many plants than Europeans usually give them credit for. Waring's "Bazaar Medicines of India" is a standing proof of the wonderful extent to which the people in Ceylon (as in India), under the guidance of their Vedarálas, utilise the vegetation of all degrees within their reach, from the stately tamarind tree or palm to the lowliest of roots or mosses. Such information and experience trickles down from father to son; and therefore it is that schoolmasters interested in their agricultural work, and well-equipped themselves, should find apt pupils among Sinhalese and Tamil lads and lasses as they teach them about plants, how best to cultivate, observe, and utilise them, with a view to gardens of their own in days to come.

But a generation must pass before the fruit of such a course of study can be seen, even if Mr. Burrows had at hand the qualified and interested schoolmasters; and this fact brings us to another side of agricultural progress among the people, which, we trust, will not be lost sight of by Mr. Willis, the Revenue Officers, or the Government. Just as every Village School ought to have its Garden for experiment, teaching and observation, so ought every Kachcheri in the island to have an Experimental Garden attached to it, specially with a view to the introduction of new products, but also for the improvement of existing plants and fruits. Such Gardens should be under the direction of the Revenue Officers (with trained gardeners from Peradeniya?) and they should be periodically inspected by Mr. Willis or a member of his Staff. Moreover, once a year there should be an Agri-Horticultural Show—an occasion as well for holiday-making and games—at the headquarters of each revenue division, such Show to be confined to the products of the district, with prices in cash, medals, and even higher honours (costing nothing!) for exceptionally meritorious cases. The expense of an annual Show, if carried on after a modest and practical fashion, and specially in the interest of the native cultivators and their headmen, should be very little; while the good achieved, through stirring up emulation as to field and garden produce and live-stock, could not fail to be considerable and to increase year by year, more especially when the annual gathering afforded the opportunity for comparing the villagers' products with those from the Kachcheri Experimental Garden, Cattle &c. Establishment; and for observing and trying useful new vegetables, fruits or other products.

We do not overlook the progress already made in multiplying Gardens, at Badulla as well as Heneratgoda, at Anuradhapura and Jaffna. But why not in the same way at the capital of each province and each district? If Revenue Officers bestir themselves to make a start with their Kachcheri Headmen, we feel sure the Peradeniya authorities will help them with plants, seed and personal aid—and that for this the sanction of H.E. the Governor in executive Council can readily be obtained. In this way, every Kachcheri might have an Experimental Garden begun before the present year expired; and if we were Governor we should take special note, in reading the Provincial and District Administration Reports for 1901, of any mention made of such Gardens and the progress attained with them. In this way, we feel certain a great advance could be made in and around our rural villages, even in the present generation. Recalling the great interest taken by Sir West Ridgeway in this subject of improved Agriculture and His Excellency's evident desire to see the well-equipped Peradeniya Scientific Staff fully utilised for the benefit of local industries, the multiplication of Experimental Gardens or Stations must have the Governor's fullest approval. They cost little (comparatively a trifle); but may achieve much.

The Practical Farmre (Price 1s.)—A Vade Mecum of Grasses, Roots and Forage crops.—Messrs. James Carter & Co. have issued a valuable pamphlet book, which will be helpful in the selection of suitable grass seed as well as for its directions for the preparation of grass land. Numerous illustrations make it easy to recognise the kinds common in Ceylon. One chapter is devoted to "Pernicious Weeds likely to occur in uncleaned samples of grass and clover seeds," and another to Furze, Gorse or Whin. From the latter we learn that Gorse as a young plant is useful as forage, being especially valuable for milch cows as causing an increasing yield of milk; but the Gorse must be young and well bruised. Other chapters are devoted to Crop Pests; Root cultivation; the cabbage as a field crops a description of the soils of Great Britain (Agricultural and Geological); Permanent Pastures.

THE BANDONG QUININE FACTORY.

The annual report of the Bandong quinine-factory expresses much satisfaction with the results of the Batavia qninine-auctions, and states that new contracts have been made with the planters, which ensnre a full supply of bark for this year. As the whole of the Company's capital is invested in the bnildings, plant, and stock, it is proposed to issue six per cent debentures for 6,250*l.*, redeemable in six years, in order to provide the necessary working capital; the whole of this issue has practically been applied for. After allowing for depreciation there remains a net profit sufficient to pay a dividend of four per cent which the Directors propose.

The Board refers to the great assistance rendered by Mr. P, van Leersnm, who superintends the work on behalf of the Government, and to whose advice the improvement in the mannfacturing process is due.—*Chemist and Druggist*, Jnne 22.

CARDAMOMS IN BRITISH CENTRAL AFRICA.

(*To the Editor of the Central African Times.*)

Dear Sir,—In Mr Hastings' very interesting article on cotton cultivation it is snggested to plant cotton between coffee, which reminds ns once more that np till the present no planter has given a proper trial to Cardamoms.

It has been said that soms Mlanje planters have gone in for them, but I gather it is only the wild specimen that has been exported. From the fact of their presence here in a wild state one may surely assume that tbe cultivation of the marketable quality is practicable. A circnmstance to be observed in general prodnce reports is that Malabar and Mysore are the only qualities ever qnoted, and this would lead one to the conclusion that countries such as Brazil and the West Coast of Africa cannot produce the Cardamom. A great drawback to a trial has probably been the difficulty of importing seeds from India, but it should be possible to obtain them from Kew. I regret I am unable to give statistics as to the yield per acre, but I have, in Calcutta, sold Cardamoms from Ceylon at prices from three to seven rupees per seer (2 and 1-7th lb); home quotations are from 1s 6d to 4s per lb. The plant is, I understand, of the vine species and is planted between six by six coffee. The picking season immediately follows the coffee crop. I am aware that this information is unfortunately very meagre; but Mr Hastings having snggested that a few acres of cotton at an estimated price of 5d per lb will do no planter any harm, I think that cardamoms, at a possible 4s per lb deserve also to be experimented with, especially as owing to our present crude and expensive transport methods only the higher-priced prodncts can be profitably handled. Few more valuable items than cardamoms can be found in the prodnce market reports.—Yonrs, etc., J W Kirk

INDIAN AND CEYLON TEA SHARES.

"TEA" ON RECOVERY IN VALUES AND SPECULATIVE TENDENCY.

June 15, 1901.

General Remarks.—As I said in my last report, only those companies which have conserved their financial position are likely to see their way comfortably through the present crisis. In the future a closer criticism of non-effective charges must be made, and directors will be wise in limiting their dividend distributions in such a way as to leave something "up their sleeves." Some of the companies appear to be feeling the pinch of finance, as witness the Imperial Company with its recent issue of debentures, and the Dooars Company seeking power from its share-holders to create fresh preference capital. In regard to the immediate market prospect for the produce, it is satisfactory to note that from Ceylon the exports appear recently to be tending smaller, while in India, owing to drought in some of the districts, the opening of the season has been backward, and no great bulk of tea is likely to come to the market here until about a month later than usual. In regard to the question of shares, there appear to be indications to an increasing extents of speculative enquiry for the cheaper as well as for the more solid issues, and shares on the whole are difficult to obtain.

At the present juncture it is interesting to note that of Indian and Ceylon companies registered in this country with sterling capital, there are altogether nearly 150, with a share and debenture capital amounting to between fifteen and twenty millions sterling. The figures compiled by Mr. George Seton, of 120, Bishopsgate Street, relating to the values of the shares of 45 representative companies, and to which we refer elsewhere, will show the depreciation on a portion of this capital—some £9,000,000. On the whole amount the loss would probably be proportionately the same, or even more so.—*Tea* for June.

FIBRE IN GERMAN EAST AFRICA.

It is expected that the cultivation of fibre will be very profitable. There are at present over 800,000 *Fourcroya gigantea* plants and 750,000 *Agave sisalana.* Compared to other products, the cultivation of fibre is very simple and inexpensive. The only fear is that, owing to over-production, the price will fall considerably, and the article will become a drug in the market. Within the last few months Fourcroya hemp has fallen from 33s to 25s per cwt. The first Sisal Agave bulbs were introduced by the German East Africa Company in 1891, forty-six being brought from Yucatan and planted in the Kikogwe estate. From the original forty-six plants over 700,000 have been obtained in nine years. At Kikogwe alone there are 640,000 covering an area of 1000 acres, whilst 65,000 have been distributed amongst the German East Africa Company's other estates. The Sisal Agave at Kikogwe only lives for five or six years when allowed to go to seed. When the leaves are regularly cut, the life of the plants will probably be considerably longer. The annual produce of each plant is about forty leaves, or 2¾ lb of dry fibre. During the year under review a sample of 100 cwt of fibre was sent out and sold for 50s per cwt.—*British Acting Vice-Consul at Dar-es-Salaam.—British Trade Journal.*

"ANNALS OF THE R. B. GARDENS, PERADENIYA."

We have to give a hearty welcome to this new periodical, edited by Mr. Willis as Director and to be representative of the work of himself and the full scientific staff now attached to his department. We have already published the prospectus, and the first part opens very appropriately with a succinct and interesting history of the Ceylon Botanic Gardens, from the days of Governor North onwards, from the pen of the Director. It is interesting to be reminded that J. G. Lear who was in charge of the Gardens from 1837 to 1840 (and many of whose letters are reproduced in our *Literary Register*) planted

tea at Nuwara Eliya so early as 1837! He also laid out the beautiful group of palms at the entrance to the Peradeniya Gardens.

A second paper by Mr. Willis is on "the Royal Botanic Gardens of Ceylon as a centre for Botanical Study and Research," a popular statement which ought to be the means of bringing many scientific visitors to Ceylon. It is mentioned, *inter alia*, that a resthouse is shortly to be opened at Peradeniya and other accommodation is often available.

It will be understood that the "Annals" are to be devoted chiefly to scientific botanical papers (some in French and German) and will not interfere with the appearance from time to time of the Gardens "Circulars" on planting topics which have hitherto been so much appreciated, and most of which have been reproduced in our *Tropical Agriculturist*. In conclusion we may quote the following particulars from the History of the Gardens:—

The present organization and staff of the Department is as follows:—

Director: J. C. Willis, M.A., F.L.S.
Chief Clerk: R. H. Pereira.

SCIENTIFIC DEPARTMENT.

Botanist: The Director.
Assistant Director and Mycologist: J. B. Carruthers, F.L.S.
Entomologist: E. E. Green, F.E.S.
Agricultural Chemist: M. K. Bamber, F.C.S.
Assistant: H. Wright, A.R.C.S.
Draughtsman: W. de Alwis, Muhandiram.
Herbarium and Laboratory Attendants, and two Plant Collectors.

BOTANIC GARDENS DEPARTMENT.

Peradeniya.—Curator: H. F. Macmillan, and native staff.
Hakgala.—Superintendent: W. Nock, and native staff.
Henaratgoda.—Conductor: S. de Silva, and coolies.
Anuradhapura.—Conductor: D. F. de Silva, and coolies.
Badulla.—Conductor: D. D. Fernando, and coolies.

PROPOSED EXPERIMENTAL GARDENS DEPARTMENT AND AGRICULTURAL SCHOOL.

(Not yet organised.)

Superintendent, foremen, and coolies.
Teaching Staff: The Officers of the Department.

GREEN TEA REPORT.

(FOR THE WEEK ENDING 6TH JUNE, 1901.)

CEYLON GREEN TEA.—The prices paid are a little stronger than at last sales, full-sized breaks being competed for, but so many of the teas arrive in quantity so insignificant as not to make it worth buyers while to attend to them: twenty lots this week totalled only 103 packages, only one line exceeding 13 chests, many being but one to three chests or halves: the prices consequently being very low, one invoice averaging 2¼d per lb.

WALKER, LAMBE & Co.

THE DEAF HEAR.—No. 479 of *The Illustrated World* of 626, Chiswick High Road, London, W., England, contains a description of a Remarkable Cure for Deafness and Head Noises which may be carried out at the patient's home, and which is said to be a certain cure. This number will be sent free to any deaf persons sending their address to the Editor.

INDIA AND FRENCH IMPORT DUTIES.

EXTENSION OF THE MINIMUM TARIFF.

Simla, July 10.—The following has been issued by the Finance Department:—"By a Decree published on the 27th December, 1900, the French Government continued till the 30th June, 1901, their minimum tariff for Colonial produce of various countries, including British possessions. Intimation has been received from the Secretary of State for India, that the minimum tariff has been further prolonged till the 23rd Feb. next."

NO FRENCH COUNTER-PROPOSALS.

Simla, July 11.—No special proposals from the French Government have reached the Government of India for relaxing the Indian import duties in favour of France, or facilitating cooly emigration to Madagascar, in return for continuing the present French tariff.—*Madras Mail.*

NEGRI SEMBILAN.

(Extracts from the Annual Report for the year 1900.)

THE REVENUE collected during the year amounted to $1,251,366·14, as against $1,085,015 collected in 1899. The total value of trade amounted to no less than $11,330,000, being an increase of $2,489,000 over that of the previous year. The export of coffee, tapioca, and tin showed a considerable increase, but in the case of gambier and pepper there was a decrease.

COFFEE.—The price of coffee, which showed some little improvement in March, has again fallen to a figure which can only be remunerative to the most economically managed, as well as the most productive, estates. To make matters worse, in June, a veritable plague of caterpillars, the larva of *Gephenodes hylas*, one of the bee hawk moths, was found to be infesting many estates. Previous experience in Selangor has shown that the only remedy likely to be of use was to pick the caterpillars off by hand, and to enable this to be promptly done the Government lent as much labour as was available. Many estates were attacked, most were rescued after a large expenditure, but one had to be cut down and burnt. The owner of the latter, a Chinaman, was compensated by the grant of a tract of mining land. The Resident of Selangor rendered much assistance to Negri Sembilan by sending Mr. Butler, the Curator of the Selangor Museum, who had experience of previous outbreaks in Selangor, to advise and assist in the extermination of the caterpillars. I desire to record the thanks of this Government to both the above gentlemen. More than one estate went out of cultivation during the year, which has been one of great severity to all coffee estate owners.

PADI.—The crop of padi just harvested has proved generally poor. This is attributed to a prolonged drought, which set in soon after the young plants were transplanted to the fields, and to the absence, through the ravages of rinderpest, of a sufficient number of buffaloes when the fields were prepared. In parts, rats are said to have done much damage. Next season it is proposed to experiment with Loffler's typhimurim bacillus, which, if successful, should prove a great boon to the native community. In the Coast district steps were taken to encourage the settlement of some Banjarese padi planters, but nothing has yet been settled. These people have shown themselves most expert padi planters in the Krian district of Perak and their settlement in Negri Sembilan is greatly to be desired.

TAPIOCA.—Applications continue to come in for lands for tapioca cultivation, and attempts, not altogether successful, have been made to insist on some

form of permanent cultivation on lands to be planted with this product. I doubt whether the results would in any case be commensurate with the outlay involved. Chinese who understand the cultivation of tapioca do not necessarily understand the planting of coconuts or rubber, and are consequently loth to undertake such cultivation.

COCONUTS.—I am glad to say that the cultivation of coconuts has received much attention and many new plantations have been started, more especially in the Coast district, which is the most suited to them. Coconut planters, like other agriculturists, have their troubles. In new plantations wild pig do enormous damage by rooting up and eating the seed coconuts. Nothing seems to be quite effective against their ravages, although both barbed wire fencing and deep ditches have been tried. Again, when the trees have grown, the boring beetles (*Oryctes rhinoceros* and *Rhynchophorus ferrugineus*), by eating the heart of the trees, kill targe numbers. A special enactment has been provided to compel owners of trees to keep them clean and free from the larvæ of these beetles. The provisions of this enactment were carefully enforced by the Forest Officer and Inspector. The District Officers write in favourable terms of the work done by the Inspector, who visited upwards of three thousand gardens during the year.

THE NEW GRAFFE-LIKE ANIMAL.

SKIN AND TWO SKULLS RECEIVED IN LONDON.

Prof. Ray Lankester has now received the case, shipped at Mombassa on April 19th, containingthe skin and two skulls of the remarkable new giraffe-like animal obtained from the Semliki forest by Sir Harry Johnston, and sent by him for preservation in the Natural History Department of the British Museum. Writing to the *Times* with reference to the specimens, Prof. Lankester says:—"The animal is a giraffe-like creature devoid of horns, with relatively short neck and with colour stripes on the limbs, but nowhere showing spots or areolæ like those of the giraffe. Sir Harry Johnston was amply justified in assimilating the animal to the extinct Helladotherium, but after an examination of the skulls I am of opinion that the 'Okapi' (the native name by which the new animal is known) cannot be referred to the genus of the Helladotherium, but must be placed in a new genus. I must say that, although the horny hoofs are not present, yet the double bony supports of the hoofs are preserved with the skin, and leave no doubt, even without reference to the accompanying skulls, that the animal which bore the skin was not a horse-like creature, but one with cloven hoofs."—*Nature*, June 20.

A LONG PERIOD SUNSPOT VARIATION.*

It has long been known, and Dr. Rudolf Wolf of Zurich was the first to draw attention to it, that the length of a sunspot period is only in the *mean* eleven years, and that the real length of any one period might differ from this value by as much as ± two years. Another fact of observation is that the times of maxima do not occur a constant number of years after a preceding minimum, and Dr. Wolf determined the *mean* interval as 4·5 years. The minimum also follows the maximum in a *mean* interval of 6·5 years

It has further been noticed that the intensity of each period, *i.e.* the total amount of spotted area, included between one minimum and the next, was not constant. Dr. Wolf held that these quantities indicated a certain periodicity, and at first suggested a period of 178 years, and later 55·5 years, or a period extending over five eleven-year periods (11·1 × 5 = 55·5).

The present investigation was limited to the interval of time, namely, 1833-1900, over which *systematic* observations of the sun's surface have been regularly made, and, as Dr. Wolf's relative numbers agree well with the actual facts of observation over this period, these numbers have been employed.

Since then, in addition to the well-known eleven-year period of sunspot frequency, there is another cycle which extends over about thirty-five years, and which is indicated clearly, as has been shown, both by the changes in the times of the occurrence of the epochs of maxima and in the variations in area included in consecutive eleven-year periods of both sunspot and magnetic curves, it is only natural to suppose that this long-period variation is the effect of a cycle of disturbances in the sun's atmosphere itself.

Such a cycle, if of sufficient intensity, should cause a variation from the normal circulation of the earth's atmosphere, and should be indicated in all meteorological and like phenomena.

We are indebted to Prof. Ed. Brückner for the great work on the changes in climates, and in this investigation he sought variations in the observations of the height of the waters in inland seas, lakes, and rivers; in the observations of rainfall, pressure, and temperature; in the movements of glaciers; in the frequency of cold winters; growth of vines, &c.

The result of the whole of the investigation led him to the conclusion that there is a *periodical variation in the climates over the whole earth, the mean length of this period being* 34·8 + 0·7 *years*.

Prof. Brückner was so convinced of the undoubted climate variations which he deduced, and so certain that such variations could only be caused by an external influence, that he investigated Wolf's sunspot numbers to see whether such a cycle was indicated. Not finding any, he was led to make the bold suggestion that such a variation as he sought must really exist in the sun, but might possibly be independent of sunspots. He finally concluded that the climate variations are the first symptom of a long-period variation in the sun, which probably will be discovered later.

In the light of the secular period of solar activity dealt with in this article, Prof. Brückner's conclusions are of great interest, because not only does the length of the period, but the critical epochs of his cycle, completely harmonise with those found in the present discussion of the sunspot and magnetic curves.

Prof. Ed. Richter, in a detailed investigation of the movement of glaciers, has also found a cycle of thirty-five years, and he pointed out that the variations agreed generally with Brückner's climate variations, the glacier movement being accelerated during the wet and cool periods.

Again, Mr Charles Egeson not only finds a secular period of about thirty-three to thirty-four years in the occurence of rainfall, thunderstorms, and westerly winds in the month of April for

* Extracts from a paper, "The Solar Activity 1833-1900," read before the Royal Society on May 23rd, by Dr. William J. S. Lockyer.

Sydney, but the epochs of maxima of the two latter harmonise with the epochs of the thirty-five-yearly period deduced for sunspots.

There seems little doubt that, during the interval of time covered by the present sunspot discussion, the meteorological phenomena, number of auroræ, and magnetic storms show secular variations of a period of about thirty five years, the epochs of which harmonise with those of the secular variations of sunspots. As we are now beginning to approach another maximum of sunspots which should correspond both in intensity and in time of occurrence after the epoch of the present minimum with that of 1870-8, it will be interesting to observe whether all the solar, meteorological and magnetical phenomena of that period will be repeated.

WILLIAM J. S. LOCKYER.

—*Nature*, June 20.

RAW RUBBER NOTES.

LAGOS.

The exports of rubber from Lagos show a marked falling off since 1896; the figures for the past five years are as follows:—1895, £269,892; 1896, £347,721; 1897, £283,184; 1898, £285,409; 1899, £160,315. The decrease in the export of rubber, from £347,721 in 1896 to £160,315 in 1899, is clearly due to the reckless and unskilful manner in which rubber was collected, which resulted in killing the majority of the trees. The collecting of rubber has been prohibited for a period of two years, to give time to the trees that survived to recover themselves. Planting is also being encouraged. Concessions of timber lands are being granted to Europeans and natives, with exclusive timber-cutting rights, on the condition that certain payments are made to the native authorities, and young trees planted to take the place of those cut down.

In places where the native authorities are un willing to protect the timber, trees continue to be felled recklessly, and no attempt is made at replanting. But it is hoped in time to overcome these difficulties and extend the protected areas. Vigorous action is being taken to suppress the ruthless tapping of the rubber trees, and every assistance is being given with regard to planting. By these means there are possibilities in the future of reviving this industry

PARAGUAY.

Rubber is not found in the wild state to any great extent in Paraguay, but attempts are being made to cultivate it, and it is thought that the most suitable species for artificial cultivation will be the manicoba of Brazil, owing to its rapid growth and general hardiness. The manicoba is said to have given excellent results in Brazil and in Central America, and it is stated that the Paraguayan Government intends to offer special inducements to agriculturists in order to develop this industry.

GUTTA-PERCHA FROM CENTRAL AMERICA.

Dr. Paul Preuss has found plentifully in the west of Central America, especially in Nicaragua, Salvador, Guatemala, and Mexico, a plant with strange-shaped leaves, which the natives called "Cojon de puerco." Its real name is Tabernæmontana Donnell Smithii Rose, and it belongs to the family of the Apocynaceæ; it grows mostly as bushes, but often attains the height of trees, and can therefore be used as a shade to coffee and cocoa trees in regions up to 700 metres above sea level. The leaves, bark, and especially the fruits, produce a great quantity of milk, which does not change in a solution of salt, acetic acid, or cold citric acid, but is coagulated by cooking in water into a yellow-white, and later on yellow-brown, mass, that gets hard in the open air slowly, and is soft and kneadable again in warm water. By order of the Colonial Committee of Berlin, the plant has been cultivated from the seeds in the botanic gardens at Berlin and Victoria (in the Cameroons), and it is pretty sure that it will be introduced into the Cameroons on a large scale. About 6 gr. of the coagulated milk have been analysed in the Pharmaceutical Laboratory at Berlin by Professor Dr. Thoms and Dr. Mannich, and no substantial distinction has been noted between this product and the real guttapercha. Fifty per cent. of the coagulated stuff is soluble in acetone, but Dr. Mannich does not think this bad, as many descriptions of gutta-percha in the market do not contain less resin. As the power of resistance against solutions of salt especially is all right, it may be well used as a substitute for gutta-percha. Dr. Preuss thinks that this discovery is of a great and practical importance, for in his opinion there is nothing in the way of cultivating the plant. The first fruits are received after four to five years, whereas the growing of the Sapotaceæ, which furnishes us at present with gutta-percha, takes a much longer time. With regard to the high prices of gutta-percha, it may be recommended to ascertain the quantity of gutta-percha in the dried leaves, bark, and fruits of this plant in order to effect the most advantageous method of cultivation.

BOLIVIA.

The German Consul in Cochabamba, in his recent report, states that the export of caoutchouc has much increased during recent years. According to the port of shipment, Bolivia is divided into different regions: (1) The region of the Acre River takes the first place on account of the quantity of caoutchouc exported. Villa Bella has been appointed by the Bolivian-Brazilian Government as the port of shipment for this district, a town about 4½ miles from the Brazilian frontier. (2) The region of the rivers Madidi, Beni, Orton, Manurini, Tahuamann, and other small rivers, which are of great importance to the caoutchouc trade. (3) The region of the forests belonging to La Paz—namely, Challana, Songo, Mapiri, Huanay, Coroica, and the province of Canpolican partly. The export of these districts goes chiefly *via* Puerte Perez (Chililaya), on the Titicaca Sea, Puno, and Mollendo. (4) The region in the north and east of the department Santa Cruz, with the Velasco and Magdalena provinces. The regions round the Paragua and Verde rivers are the principal districts in this part, and they are not much explored on account of the bad lines of communication. But these districts will doubtless gain some importance later on. The export goes mostly *via* Puerto Suarez, on the Paraguay River, and only a small quantity comes *via* Cochabamba. Many caoutchouc trees have recently been discovered in Yuracares, Puerto, Santa Rosa, etc., in the Cochabamba departments, and the right to explore these forests has been granted. These districts will also be of great importance in later years. The export *via* Puerto Perez, Villa Bella, and Puerto Suarez amounted in 1895 to 820,410 kilos., in 1896 to 1,140,712 kilos., in 1897 to 1,674,216 kilos., and in 1898 to 3,155,955 kilos. —*India-Rubber Trades Journal*, June 10.

THE "VOANDZOU" is a bean from tropical Africa which, by the analysis of M Balland, communicated to the Academie des Sciences, Paris, consists of 10 per cent water; 19 of nitrogenous matter, 6 of fatty matter, 5 of amylaceous matter, and 4 of cellulose or sugar. A kilogram of voandzu contains the food required to support a man each day, namely, 120 to 150 grammes of nitrogenous matter, 56 grammes of fat, and 500 grammes of hydrate of carbon. The conclusion is that voandzu is a complete food in itself, and would be serviceable for troops in the field. It could, no doubt, be cultivated in most of our tropical or even hot countries.—*Globe*.

"THE TROPICAL AGRICULTURIST."

The twentieth annual volume of this periodical was completed with the June number; but the title page, index, &c. for the same are included with the first issue of a new year, the July number, and we give the same as a Supplement today. We began the *Tropical Agriculturist* in 1881 ("Timehri" in British Guiana began a year later), and we do not know of any similar publication in the British Dependencies, at any rate within the tropics, that has lasted so long, or been so generally appreciated by the constituency for whose benefit it was started. It has carried the name and reputation of Ceylon and its planters far and wide, and the copies officially filed in the West Indian, African, and some of the Australian Colonies afford evidence of the value attached to its contents. Of late years, not the least flattering testimony has come from French and German Dependencies; but the greatest compliment was that paid by the Agricultural Department in Washington where, on our visit in 1884, the "*T.A.*" file was brought forward as including one of their most treasured foreign receipts, and we were even asked if we knew of the existence of this Magazine from the East Indies! Of course, primarily, the periodical has been begun and continued with reference to Ceylon, Southern India and the Straits, and there are certain features —the London and Colombo Sales of Produce, Reports of Tea Limited Companies, &c.,— which make the periodical specially useful for local reference, so that it has been well said a copy should be filed in each large Tea Factory or on all plantations, especially where several products are being cultivated.

Having concluded a third series of "Planting Pioneers" in our monthly, we cried "halt" for a time; but we have been urged to resume, as there are several names of departed and living worthies still available, that ought to be embodied. The new volume is likely, therefore, to include several for a new or fourth series. But what is now wanted is a more concise and yet general Dictionary of Biography for Ceylon, to embrace, say, all the notable men of the past century in connection with the Colony with brief accounts of their career, somewhat after the fashion of Mr. Henniker-Heaton's Australian compilation, or of "Who's Who." Believing that such a work would be widely appreciated, and having a great deal of the material at hand, we are anxious to put one through our press.

Meantime as regards the *Tropical Agriculturist*, the chief *desideratum* will now be a Topical Index to the twenty volumes, and this is hastening to completion, and will enable all who possess the set (or a goodly number) of the volumes, to refer very quickly to information in respect of any product or subject treated.

A RECORD BLOCK OF MICA.

A block of pure mica, measuring a cube of six feet, has been found in Canada. This is the largest piece ever discovered, and is to be exhibited at the Pan-American Exhibition at Buffalo.—*Globe*, May 31st.

"ANNALS OF THE ROYAL BOTANIC GARDENS."

A new Official periodical makes its appearance on the scene with the second half-year of 1901, and we have to thank Mr Willis for the first issue to hand. It is introduced thus in a Circular from the Royal Botanic Gardens, Peradeniya, dated June 1901. "Commencing with the present year it is intended to issue a new Botanial Periodical, to be called 'The Annals of the Royal Botanic Gardens, Peradeniya.' It will be a journal of pure and applied Botany and will contain chiefly the results of work performed wholly or in part in the laboratories and herbarium of the Ceylon Botanic Gardens, or upon materials supplied by the gardens. It will also contain notes, papers, and reviews dealing with general tropical Botany and its applications. While in general conception it thus resembles the well-known "Annales du Jardin Botanique de Buitenzorg," it will include a somewhat wider range of matter. As in that journal, papers written in French or German will at times be included. It will be issued by the Government Printer, Ceylon, in an octavo form equal in size of page to the "Annals of Botany," and will be illustrated as required.

The "Annals" will appear at irregular intervals, each paper of any considerable size being published separately as soon as ready. The number of pages that may appear in one year will be variable, probably at first between 250 and 300. When sufficient matter has been published to make a volume of convenient size, the Index and Title Page will be issued; there will not necessarily be annual volumes.

It is not of course possible to mark out in advance the exact line to be followed by such a publication. One great object in view is the keeping together of the large amount of work dealing with Ceylon Botany, and the fostering of an *esprit de corps* among the workers in the Research Institute now established in the Colony. In the pursuit of this object, not merely will original papers be inserted, but also reviews of other papers and books and summaries of preceding work. It is intended also to publish short floras of special districts or of biological areas in Ceylon, and figures and descriptions of the less-known species of the Ceylon Flora. The following list of papers that may probably appear within the first two years will help to indicate the scope of the journal:—

A History of the Botanical Department in Ceylon, by the Editor.

The Research Institute of the Royal Botanic Gardens of Ceylon, by the Editor.

The Life-History of the Cacao Canker, by J B Carruthers.

A Revised Catalogue of the Phanerogamic Flora of Ceylon, by J C Willis.

A Revision of the Podostemaceæ of India and Ceylon, by J C Willis.

The Ceylon Ebonaceæ and their Timbers: a Systematic and Anatomical Monograph, by H Wright.

A Botany of the Maldive Islands, by J C Willis and J Stanley Gardiner.

Notes on Hemileia vastatrix, the Coffee Leaf Fungus, by C Holtermann.

The Citronella Oil Industry of Ceylon, by J C Willis and M K Bamber.

Notes on the Sapotaceæ of Ceylon and the Gutta-perchas yielded by them, by H Wright.

Studies in the Phylogeny of the Sympetalæ, by J C Willis.

The Growth in Thickness of Tropical Trees, by H Wright.

STATISTICS OF THE PRODUCTION OF TEA IN INDIA.

THE OFFICIAL RECORD FOR 1900.

Area.—The area under tea in India at the end of 1900 extended over 522,487 acres, nearly two-thirds (64·6 per cent.) being in the valleys of the Brahmaputra and Surma, which contain as much as 337,327 acres, namely, 204,985 in Assam (the Brahmaputra Valley) and 132,342 in Cachar and Sylhet (the Surma Valley). In extent of cultivation Bengal comes next. the area under tea being 134,572 acres; or 25·8 per cent. of the whole, and a little more than that in the Surma Valley.

The production of tea is, therefore, to the extent of nine-tenths of the whole area, limited to the two provinces of Assam and Bengal.

The other tenth is divided between Northern and Southern India, thus :—

	Acres.		Acres
Northern India—		Southern India—	
North-West Provinces ..	8,055	Madras ...	6,107
Punjab ..	9,745	Travancore ...	25,202
Total ...	17,800	Total ..	31,309

The principal localities in each province where tea is grown are these :—

In Assam.	Acres.	In the North-Western Provinces.	Acres.
Surma Valley :		Kamaun ..	2,921
Cachar ..	60,852	Dehra Dun ..	5,134
Sylhet ..	71,490		
Brahmaputra Valley.		In the Panjab.	
Sibsagar ...	78,422		
Lakhimpur ..	67,509		
Darrang ..	41,708	Kangra ..	9,645
Nowgong ..	12,673		
Kamrup ..	3,973		
In Bengal.		In Southern India.	
Darjeeling ..	50,769		
Jalpaiguri ...	76,278		
Chittagong ..	4,146	Nilgiris ...	2,542
Ranchi and		Malabar ..	3,058
Hazaribagh ..	3,284	Travancore ...	25,202

There is a small area of 1,479 acres in Upper Burma, but in this province the leaf which is produced is not made into tea, but is pickled to be eaten by the Burmans, and the area and production may therefore be left out of account.

Tea cultivation in India has been mainly concentrated in tracts where a heavy rainfall and a humid and equable climate permit of repeated flushes and pluckings of the leaf. In the valleys of the Brahmaputra and Surma the yield averages about 468lb to the acre ; in Jalpaiguri (the Dooars) 484lb. in Darjeeling about 279lb in the North-Western Provinces it is 309lb. In Travancore it is stated at 360lb. Elsewhere it is much lower.

The area under tea has expanded from year to year without a pause during the sixteen years comprised in the statistics appended. In 1885 the area was about 284,000 acres; in 1900 it had increased to 522,487 acres, the increase being in the ratio of 84 per cent.

The number of acres added to the tea-growi area each year has been :—

	Acres		A[illegible]
1886 ..	14,294	1893 ..	20
1887 ..	14,584	1894 ...	49
1888 ..	11,524	1895 ..	156
1889 ..	9,374	1896 ..	173
1890 ..	11,126	1897 ...	366
1891 ..	17,610	1898 ..	316
1892 ...	12,432	1899 ..	137
		1900 ..	6,28

It appears then that as much as about 107,000 acres have been added to the area under tea during the last five years. This area, in full bearing, will yield at least 40 million pounds of tea a year.

The plantations vary greatly in size. In Assam, where the industry is mainly carried on by Europeans with ample capital, where fusions of estates have been in progress for some years in view of economy of management, and where most plantations have large unplanted areas attached to them, the area of a plantation averages as much as 1,318 acres. In Bengal the average area of a plantation is 734 acres ; in the North-Western Provinces the average falls to 121 acres ; while in the Panjab, where natives grow tea extensively in the Kangra Valley, there are only about four acres to each plantation. In Madras the average is about 172 acres, and in Travancore 445 acres.

Production.—The quantity of tea produced has increased in much greater ratio than the area under cultivation, for while the area has increased by 84 per cent, the increase in production had been 176 per cent.

Repsesenting the area and production in 1885 by 100 in each case, the ratio of increase is stated below, the actual increase of production each year over the production of the preceding year being also stated :—

	Area	Quantity produced	Actual increase annually in lb.
1885	100	100	..
1886	105	115	10,899,835
1887	110	129	9,826,270
1888	114	139	7,540,462
1889	117	149	7,250,331
1890	121	156	4,993,531
1891	127	173	11,831,496
1892	132	170	—1,873,628
1893	139	185	10,253,626
1894	141	188	2,465,144
1895	146	200	8,694,783
1896	152	219	13,018,227
1897	165	215	—2,643,846
1898	177	222	3,693,192
1899	182	254	24,322,055
1900	184	276	15,663,209

Persons Employed.—The number of persons employed in the tea industry in 1900 is returned at 621,287 (permanently) and 98,446 (temporarily), or altogether a little below three-quarters of a million (719,733 persons), which would work out to about 1·38 persons to the acre.

Exports and Consumption.—The tea produced in India is exported, mainly to the United Kingdom, to the extent of about 96·6 per cent. of the average production. The subjoined figures give approximately the quantity of tea consumed in India, the figures representing the average of the last five years :—

INDIAN TEA.	Produced ..	170,509,067
	Exported ..	164,634,913
	Left in India ..	5,874,154
FOREIGN TEA	Imported ..	5,801,241
	Re-exported ..	2,563,029
	Left in India ...	3,238,212

Thus more than 9 million pounds were left in India on the average, of which 5·87 millions were Indian and 3·24 millions foreign, the bulk of the foreign tea being Chinese, though a substantial quantity consists of Ceylon tea. More than a million pounds are purchased annually for the British army, and a larger quantity must be consumed by the European and Eurasian civil population, as also by natives who, in some of the larger towns, are adopting the tea-drinking habit.

The principal markets for Indian tea are stated hereunder, with the quantity exported (in lb.) to each country in the last five years :—

BY SEA.

	1896-97	1897-98	1898-99
United Kingdom..	135,456,884	137,655,957	139,245,995
Australia ..	6,155,895	6,792,654	6,306,135
United States and Canada ..	1,607,731	1,523,236	2,457,880
Persia ..	1,993,823	1,464,394	3,456,791
Russia ..	457,634	689,271	500,889

	1899-1900	1900-01
United Kingdom ..	154,161,492	166,171,556
Australia ...	8,362,797	10,438,984
United States and Canada ...	4,677,797	3,490,451
Persia ...	1,953,900	2,429,140
Russia ..	467,451	772,495

TRANS-FRONTIER—

	1896-97	1897-98	1898-99
Kabul, Kashmir, & other countries on the North-Western Frontier ..	1,498,672	867,888	1,040,704
Other trans-frontier countries ..	13,552	18,144	23,968

	1899-1900	1900-01
Kabul, Kashmir, & other countries on the North-Western Frontier ..	2,099,328	1,942,640
Other trans-frontier countries ..	25,312	25,760

The production of tea in India and Ceylon has increased so much more rapidly than the consumption in the United Kingdom, which is the principal market for these teas, that there has been a heavy fall in price and the tea industry is at the moment in a position of great embarrassment. Producers are busily engaged seeking relief from the introduction of economies and from the enlargement of markets other than that in the United Kingdom.

Prices.—The course of prices of tea in Calcutta is illustrated in the appended figures in which the price in March 1873 is taken as equal to 100.

They represent the course of prices of fine Pekoe in January of each year as given by the Bengal Chamber of Commerce. It will be observed that the price in January 1901 fell to the lowest level yet known :

1873 ...	100	1888 ..	84
1874 ..	123	1889 ...	77
1875 ..	123	1890 ..	63
1876 ..	136	1891 ..	81
1877 ..	148	1892 ..	71
1878 ..	135	1893 ...	87
1879 ...	129	1894 ..	52
1880 ..	126	1895 ..	97
1881 ..	135	1896 ...	84
1882 ..	126	1897 ..	64
1883 ..	110	1898 ..	61
1884 ...	116	1899 ...	58
1885 ..	90	1900 ..	64
1886 ..	90	1901 ..	45
1887 ..	77		

In the Statistical Department the average prices of the various descriptions of tea sold at the public sales held in Calcutta during the tea season have been computed for some years past. From these accounts the figures below are taken, being the prices in annas and pies per pound of the three descriptions which form the largest proportion of the tea sold and the variations in the prices, the average price of 1888 being represented by 100 :—

	Broken Pekoe			Pekoe			Pekoe Sou.		
	Price		Variation	Price		Variation	Price		Variation
	As.	Pies.		As.	Pies.		As.	Pies.	
1888..	10	3	100	8	1	100	6	3	100
1889...	9	9	95	7	5	92	5	7	89
1890..	8	10¾	87	7	2	89	5	8¼	91
1891..	8	7½	85	7	0½	87	5	3⅓	184
1892..	11	3⅓	110	8	9	108	6	5¼	103
1893..	9	2 4-5	90	7	2⅔	90	5	4 4-5	87
1894...	11	8	114	9	4 4-5	116	7	2 5-7	116
1895..	9	—	88	7	3 4-7	91	5	11	95
1896..	8	7¾	85	6	9 9-10	85	5	5½	88
1897..	7	5 5-7	73	6	0¾	75	4	10⅔	79
1898..	7	—	68	5	8	70	4	7	73
1899..	6	9¾	66	5	8¾	71	5	0⅔	81
1900..	6	—	59	5	—	62	4	1⅔	66

J. E. O'CONOR;

June 28th, 1901. Director-General of Statistics.

—*Capital*, July 14th.

GREEN TEA REPORT.

[For the week ending July 4, 1901.]

(Walker, Lambe & Co.)

London, July 5, 1901, E.C.

Owing to the small supply left in importers' hands, there has been no auction sale this week, but privately there have been a few transactions at fully late rates.

CEYLON GREEN TEAS.

The only offerings have been three small lines of very nice cup teas, which, being in such small quantity, buyers neglected and they sold very cheaply at from 4d to 6½d. Buyers are remarking that, having taken trouble to introduce these teas, the supply is not continuous enough to meet the enquiries which have followed from the earlier sales, and that, as it is put by some, "They will have to do the work of introducing them all over again."

THE RUBBER INDUSTRY IN NATAL.

A few months ago the Government advertised for a man capable of carrying on experiments in connection with the institution of a "rubber" industry, and for a man competent to point out where rubber trees existed in a wild state, or where imported trees might grow. It is understood that such a man could not be found in South Africa. Messrs. Medley Wood and Maurice S Evans interested themselves in the subject, and it is probable that a Commission will start, when the labours of the session are over, for a part of the Colony in which it is probable good rubber soil will be found.—*Natal Mercury*, June 24.

Castor Oil Trees in Natal.—The General Manager, Natal G. R., has seen that the new engine-sheds on the Zwaartkop Road have been constructed near large plantations of castor oil trees, and it is rumoured that a castor oil facctory is to be started near the City, with the N.G.R. as chief consumer.—*Natal Witness*, June 18.

Abyssinian 'tef' (poa abyssinica) is the seed of a grass which the people consume (see Sagot's 'Manuel des Cultures Tropicale'). By analysis it contains 8½ per cent of nitrogenous matter, 75½ per cent of amylaceous, and nearly 2 of fatty matter, besides nearly 2 of cellulose. It is, therefore, a grain worthy of attention in other hot countries.—*Globe.*

Burma Ruby Mines Co:—16½ Per Cent.—The report of the Burma Ruby Mines Co., for the year ended February 28th shows a profit of £33,845, from which the percentage payable to the Government of India, amounting to £12,440, has to be deducted. Including £8,881, brought forward, there is a total balance of £36,286. The Directors recommend a dividend of 16½ per cent., free of tax, on the ordinary shares for the year, leaving a balance of £10,123 to be carried forward. During the year under review 947,444 loads of ruby earth were washed at an average cost of 10·39d., as compared with 888,135 loads in the previous year.

Mr. A. Cooke's Scheme for a Tea Reserve.—So far we have had but three opinions vouchsafed to us upon the striking scheme for a great tea Indo-Ceylon reserve and an immense increase to the forces available for exploiting foreign markets. One of them is that the proposals are quite impracticable. Another, which we shall publish tomorrow, comes from a planter who adds that he "cannot see that Mr. Cooke's scheme is practicable at present. What we want is more money to encourage Traders in foreign countries to hold and make known by advertising and other methods the high qualities of our teas." The third appears elsewhere. This scheme is not one that can leap into popular favour at once and will require a good deal of backing before it can be put into forces. But it cannot be denied that the exploitation of foreign markets will have to be taken up on a good deal larger scale than now if cultivation continues to increase with the opening up of new land—outside the countries where it is the leading product today.

Fiji.—The Receiver-General's annual report on the trade and commerce of Fiji shows that the exports from the colony for 1900 were valued at £619,836, as against £481,856 for the previous year. The imports were £349,890 (including £6,027 for re-exportation) as compared with £263,044 for 1899; and the total trade of £969,726, as compared with £744,900. The improvement in the export is mainly due to the greatly increased production of copra. The import of live stock amounted to £23,358, as against £8,292 for 1899. The Customs duties levied for 1900 were £65,932 11s 5d, an increase of £13,305 16s 11d on the previous year. Included in the exports were 32,961 tons of sugar, 15,605 tons of copra, 158,224 gallons of distilled spirit, and 396,242 bunches and 46,224 cases of green fruit. The export of copra exceeds that of any previous year by 7,000 tons. Minor exports show no tendency to increase. Of the total trade the port of Suva contributed £770,266 and Levuka £199,460. The wharves at the former port are now being extended. There are in the islands 68 European-owned vessels aggregating 1,106 tons, and 105 native-owned vessels aggregating 893 tons.—London *Times,* June 19.

Anglo-Ceylon and General Estates Company.—We direct attention to the full report of the past year's working of this Company which we give on our sixth page today, having been kindly placed at our disposal by the Hon. Mr. J. N. Campbell. The very wise precaution has been taken of strengthening the reserve fund and, making allowance for a dividend of 4 per cent on the consolidated stock, there is the substantial balance to be carried forward of over £13,000 in order to meet contingencies in view of the unsettled state of the market. The price of the Company's tea has, we are glad to see, been well maintained. A fairly good account is also given of the Mauritius sugar estates as well as of the rubber, coconuts and other products in Selangor.

Indian and French Import Duties.—Indian and perhaps Ceylon planters will be glad to read the Notification of the Finance Department, issued on Wednesday, to the effect that the French Government has decided to prolong till the end of February next the minimum tariff for tea, coffee, pepper, etc. The fact that the minimum tariff has merely been prolonged temporarily for eight months shows that the French Government has not yet altogether made up its mind in the matter. The truth seems to be, as was lately pointed out, that the French Government has a *quid pro quo* in view; and it has prolonged the *status quo* for eight months longer in order that there may be time to negotiate with the British Government. There seems to be no room for doubt that the principal "compensation" that France is seeking is British Indian cooly emigration for Madagascar, where such labour is urgently required. Already one batch—says the *Madras Mail*—of Indian coolies has been sent there from Pondicherry, as the result of a private recruiting venture.

"Nature Study" in Rural" Schools.—The Technical Instruction Committee of the Bedfordshire County Council have this year arranged, for the assistance of elementary teachers in rural districts, a series of 12 lectures on Saturday mornings upon "Naked-Eye Botany," supplemented on six of the Saturday afternoons by field excursions under the direction of local botanists at which "attention was specially directed to the commonest and most widely representative examples." Both the lecturer and excursion guides, we are told, disclaimed as an end in view the collection of rare specimens or minute scheduling of variations, their object being to encourage in young teachers such a knowledge of the common plants of the countryside as may enable them to stimulate in their pupils "an interest in the vital processes and in the leading characters of the vegetation of both farm and garden." Those who attend are invited to answer weekly questions on paper, and also to forward specimens of plants for identification to their excursion guides"—an invitation that might conceivably encourage the spoliation of rare flora, that is complained of elsewhere. But the scheme, speaking generally, seems carefully designed to avoid such a result; and is stated thus far to have been much appreciated.—London *Times,* June 21.

The Export of Caoutchouc—from French Tonquin last year—amounted to 300,400 kilos, says the *India Rubber Journal*, the greatest part of which went *via* Hongkong, only a small quantity being shipped from Haïphong direct to Europe.

A New Process for Moulding Sweet Biscuits is being worked in Philadelphia, which includes the use of rubber. It consists in placing a thin sheet of tough elastic India-rubber between the moulding dies and a layer of dough. When the die cutter is forced into the dough the rubber conforms exactly to the design in the die by minutely reproducing the same through the rubber upon the dough. By this process very thin wafer-like biscuits, with a highly embossed surface, can be turned out at much greater speed than ordinary methods.—*India-rubber Trades' Journal*, July 24.

Planters and New Products.—A correspondent writes:—"We tried making tea seed oil and the oil was successfully made, but the cost was prohibitive. I was reading somewhere about sunflower-seed oil being valuable. Now sunflowers grow like weeds here and our patanas could soon be full of them, if some one with means and leisure would kindly experiment and give less fortunate planters the benefit of his experience?" We fear neither sunflower nor tea seed oil will pay to make in Ceylon. But sunflower seed is said to be valuable for feeding stock. The time is approaching when systematic experiments can be made at the new Government Farm, Gangaroowa, under the auspices of Mr. Director Willis and staff.

Company Reports.—We publish on page 121 the annual report of the Bogawantalawa Company. The yield of tea largely exceeded the estimate in spite of finer plucking during the last three months of the season, and the cost of production, though slightly higher than last year, is still moderate. The expenditure includes that incurred on new clearings, buildings, and machinery. The total yield was 1,236,272 lb. tea plucked off 2,185 acres, being at the rate of 565 lb. per acre all round, costing free on board at Colombo 23·92 cents or 3.93 d. per lb. The gross average price of the 1,220,246 lb. sold in London was 7·51d. per lb. The crops for the current season owing to finer plucking are estimated at 1,188,000 lb. tea. The gross average at which drafts were negotiated was 1s. 4¼d. per rupee against 1s. 4 5-16d. in the previous season. The profit for the year amounts to £13,290 5s. 11d., to which has be added interest, £132 7s. 11d., and the balance from last year of £952 10s. 5d. It is proposed to pay a final dividend of 4½ per cent. on the ordinary shares making 6 per cent, for the year, which will acquire less tax, £4,275; to transfer to reserve (increasing this account to £4,500) £1,500 and to carry forward to next year the balance of £753 2s. 3d. —We also give the report of the Dumont Coffee Company in which Ceylon men are interested. The causes are explained, which have led to a considerable diminution of profit. As the result of this the directors have considered it advisable, instead of declaring a further dividend, to place the sum of £20,000 to reserve account and carry forward £10,263 15s. 7d. The property of the Company seems to be in a satisfactory condition.

The French Indo-China Consular Report for 1900, sent here May 8th, states that the exports of gutta-percha for 1900 amounted to 39,000 kilos, against 58,813 kilos in 1899. The gutta percha comes chiefly from Annam and Laos. A picul of good quality is worth about £13. The rubber and gutta-percha are subject to an export duty per 100 kilos of 100 francs—equal to £4.—*India-rubber Trades' Journal*, July 24.

Sugar-Growing in the Straits.—It appears that sugar planters are prepared to take up thousands of acres in the Selinsing division, if the Government will grant the land for that purpose. A large sugar factory of the latest type was opened on the Gedong Estate late in the year, where over a thousand acres are under cultivation. There is no doubt a great future before sugar in this district, if difficulties be not thrown in the way of its cultivation.—*Official Report for 1900*.

Planting in the Straits.—The Collector of Klang reports high prices prevailing for land in the neighbourhood of Kuala Klang, on which he has reason to believe the present owners propose to erect permanent buildings, and, although there is a tendency to surrender the unopened land on some European-owned estates, agricultural land is still in request by both European and Native planters. Coconuts, rubber and coffee are the principal products at present under cultivation.—*Official Report for 1900*.

Bolivian Exploration.—Reuter's Agency is informed that an expedition sailed yesterday for the Isthmus of Panama, whence it will proceed to Bolivia for the purpose of continuing the exploration work in that country which was begun by Sir Martin Conway. The region to be explored lies between the crest of the Andes and the great Amazonian plain, and between the rivers Kaka and Beni and the river Pando or Tambopata, an area of over 10,000 square miles. The expedition is equipped and sent out by Sir Martin Conway. Its leader is Mr John W Evans, D.Sc., a well-known geologist and traveller, who has previously done good work in the western part of Brazil. With him go Mr John Turle, assistant geologist, and Mr Gerard A Watney, B A., surveyor. They will be joined by an experienced botanist from the United States and by a zoologist already in the country. The expedition is fully equipped with all needful scientific appliances, and will spend one year in making a thorough scientific examination of the region. They will make as complete scientific collections as possible, and, if expectations are realsied, will bring back valuable observations and maps of general scientific and geographical importance. The collections will ultimately be presented to the public museums of London and New York, and it is hoped that they may fill a gap in the national collections on both sides of the Atlantic. The country to be explored cannot be described as wholly unknown, but it is for the most part unmapped; it has never been scientifically explored, and great areas of it have only been visited by native prospectors. In this region are the fertile valleys of Las Yungas and the famous gorges of the Tipuani, Mapiri, and Coroico, whence so large a part of the gold of the Incas was brought. The hill-sides produce every kind of tropical and sub-tropical crop, Yungas coffee being in the opinion of many experts the best in the world. Indeed, all the products of the Yungas valleys are not merely rich, but of singular excellence.—London *Times*, June 27.

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	—	865XD	865XD
Ceylon Tea and Coconut Estates	500	—	—	...
Castlereagh Tea Co., Ltd.	100	70	..	..
Ceylon Provincial Estates Co. Ltd.	500	..	500	500
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	—	75	—
Clyde Estates Co., Ltd.	100	—	—	--
Doomoo Tea Co., of Ceylon Ltd.	100	—	..	65
Drayton Estate Co., Ltd.	100	...	...	...
Eila Tea Co., of Ceylon, Ltd.	100	..	40	...
Estates Co of Uva, Ltd.	500	..	250	—
Gangawatta	500	—	—	..
Glasgow Estate Co., Ltd.	500	940	915XD	—
Great Western Tea Co., Ltd.	500	600	—	—
Hapugahalande Tea Estate Co.	200	—	—	..
High Forests Estates Co., Ltd	500	...	550	...
Do part paid	400	—	450	—
Horekelley Estates Co., Ltd.	100	—	..	65
Kalutara Co., Ltd.	500	—	250	—
Kandyan Hills Co., Ltd.	100	—	40	—
Kanapediwatte Ltd.	100	—	85	—
Kelani Tea Garden Co., Ltd.	100	—	—	—
Kirklees Estates Co., Ltd.	100	—	120	...
Knavesmire Estates Co., Ltd.	100	—	60	—
Maha Uva Estates Co., Ltd	500	—	400	—
Mocha Tea Co., of Ceylon, Ltd.	500	650	—	..
Nahavilla Estate Co., Ltd.	500	—	300	...
Neboda Tea., Co. Ltd	500	..	500	—
Nyassaland Coffee Co. Ltd	100	—	—	..
Palmerston Tea Co., Ltd.	500	...	400	—
Penrhos Estates Co., Ltd.	100	—	100	—
Pitakanda Tea Company	500	—	—	-
Pine Hill Estate Co., Ltd.	60	—	37·50	—
Putupaula Tea Co., Ltd.	100	—	—	..
Ratwatte Cocoa Co., Ltd.	500	—	250	—
Rayigam Tea Co. Ltd.	100	—	40	...
Roeberry Tea Co., Ltd.	100	50	60	..
Ruanwella Tea Co., Ltd.	100	—	30	—
St. Helier's Tea Co., Ltd.	500	—	500	...
Talgaswela Tea Co., Ltd.	100	—	35	...
Do 7 per cent Prefs.	100	..	70	..
Tonacombe Estate Co., Ltd.	500	..	325	...
Udugama Tea & Timber Co., Ltd.	50	..	..	..
Union Estate Co., Ltd.	500	...	200	...
Upper Maskeliya Estates Co. Ltd.	500	—	450	—
Uvakellie Tea Co., of Ceylon, Ltd.	100	55	..	—
Vogan Tea Co., Ltd.	100	50	...	—
WanarajahTea Co.,Ltd.	500	..	—	—
Yataderiya Tea Co., Ltd.	100	—	300	—

Ceylon Commercial Companies.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	...	30	—
Bristol Hotel Co., Ltd.	100	..	125	—
Do 7 per cent Debts	100	105	—	—
Ceylon Gen. Steam Navgtn. Co., Ltd.	100	220	..	220
Colombo Apothecaries' Co. Ltd.	100	...	137½	—
Colombo Assembly Rooms Co., Ltd.	20	15	..	...
Do prefs.	20	...	..	—
Colombo Fort Land and Building Co., Ltd.	100	75	85	..
Colombo Hotels Company	100	292·50	—	..
Galle Face Hotel Co., Ltd.	100	155	...	..
Kandy Hotels Co., Ltd.	100	...	122·50	..
Mount Lavinia Hotel Co., Ltd.	500	...	..	...
New Colombo Ice Co., Ltd.	100	...	190	175
Nuwara Eliya Hotels Co., Ltd.	30	27½	...	...
Do 7 per cent prefs.	100	100	...	..
Public Hall Co., Ltd.	20	12½	14	—

LONDON COMPANIES.*

Company	paid p. sh.	Buyers.	Sellers.	Transaction
Alliance Tea Co., of Ceylon, Ltd.	10	...	8—9	..
Anglo-Ceylon General Estates Co.	100	..	45—55	..
Associated Estates Co., of Ceylon	10	-	1—3	...
Do. 6 per cent prefs.	10	..	4—6	..
Ceylon Proprietary Co.	1	...	¼—½	..
Ceylon Tea Plantation Co., Ltd.	10	..	24—25	..
Dimbula Valley Co., Ltd.	5	..	5—5½	..
Do prefs.	5	..	5–6	...
Eastern Produce & Estates Co. Ltd.	5	...	3½—4½	..
Ederapolla Tea Co., Ltd.	10	...	6—8	...
Imperial Tea Estates Co., Ltd.	10	...	3½—4½	..
Kelani Valley Tea Asscn., Ltd.	5	..	3—5	...
Kintyre Estates Co., Ltd.	10	...	6—8	..
Lanka Plantation Co., Ltd.	10	..	3½—4½	..
Nahalma Estates Co.,Ltd.	1	-	nom	..
New Dimbula Co., Ltd.	1	...	2⅝—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	9¾	10	..
Ouvah Coffee Co., Ltd.	10	..	6—7	...
Ragalla Tea Estates Co., Ltd.	10	..	12	..
Scottish Ceylon Tea Co.,Ltd.	10	-	12—15	...
Spring Valley Tea Co., Ltd.	10	...	2—4	..
Standard Tea Co., Ltd.	6	10½	10—11	...
The Shell Transport and Trading Company, Ltd.	1	..	2⅞—3⅛	..
Ukuwella Estates Co., Ltd.	25	—	par	...
Catiyantota Ceylon Tea Co., Ltd.	10	...	5—6	...
Do. pref. 6 o/o	10	...	9—10	..

BY ORDER OF THE COMMITTEE.

Colombo, August 2nd 1901.

* Latest London Prices.

RAINFALL RETURN FOR COLOMBO.

(Supplied by the Surveyor-General.)

	1896.	1897.	1898.	1899.	1900	Av of 31yrs.	1901
	Inch	Inch	Inch	Inch.	Inch.	Inch.	Inch
January ..	2·92	3·81	2·32	6·98	3·72	3·24	11·91
February ..	0·35	1·68	1·98	2·78	0·63	1·89	3·55
March ..	5·64	3·66	4·21	0·88	3·71	4·75	5 12
April ..	5·93	10·97	22·81	6·66	15·12	11·43	8·71
May ..	9·31	8·30	5·80	17·73	10·63	12·04	6·28
June ..	8·37	10·14	10·94	9·23	7·83	8·35	5·93
July	2·85	5·24	6·15	1·11	6·77	4·30	4·52
August ..	6·35	9·09	0·97	0·62	7·35	3·79	
September	10·99	4·58	6·90	1·48	4·00	4·98	
October ..	16·78	4·71	20·60	12·99	9·47	14·36	
November..	19.81	11·66	17·38	8·58	9·25	12·55	
December..	11·76	8·89	3-05	4·44	5·20	6·35	
Total..	101·06	82·73	103·11	73·48	83·68	88·03	46·02

* From 1st to 31st July 4·52 inches, that is up to 9-30 a.m on the 1st Aug.—Ed. *C.O.*

Teak Prices.—The rise in the price of Teak timber is thus discussed by an Indian paper.—"The large rise which has taken place in the price of teak-wood is attributed to a number of causes, of which, curiously enough, the experiments conducted with the "Belleisle" is one. The last Report of the Burma Forest Department, in discussing the state of the market for this timber in London and on the Continent of Europe, states: "Planks have been in even greater request than before, owing to new sources of demand for carpentry and decorative and electrical purposes. The satisfactory results reached with H M S "Belleisle" as to the degree of inflammability of teak have tended to increase the demand for this wood by the British Admiralty." So great was the effect of these various causes that the price of teak rose in the London market, in twelve months, from £10 to £17 per load, and the Conservator of Forests, Pegu Circle, writes:—"Every indication points to a continued increase in demand and to steady maintenance, or even enhancement, of present prices."

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS.

Colombo, 29th July, 1901.

CARDAMOMS :—
All round parcel, well bleached per lb. R1·40
Do. dull medium do. R1·20
Special assortment, 0 and 1 only do. R1·80
Seeds do. R1·35

CINCHONA BARK :—
Per unit of Sulphate of Quinine 13c—1½ to 3 o/o.

CINNAMON :—
Ordinary assortment per lb. 54c.
Nos. 1 and 2 only per lb. 59c,
Nos. 3 and 4 only per lb. 49c.

CINNAMON CHIPS :—
Per candy of 560 lb R75·00

COCOA :—
Finest estate red; unpicked per cwt R50 } Quotations
Medium do do R48 } nominal. L
Bright native unpicked and undried R45 } business
Ordinary do do do R41 } doing,

COCONUTS—(husked).
Selected per thousand R46·00
Ordinary „ R40·00
Smalls „ R30·00

COCONUT CAKE—
Poonac in robins f. o. b. per ton R82·50
Do in bags None

COCONUT (Desiccated).
Assorted all grades per lb 16c

COCONUT OIL—
Dealers' Oil per cwt R16·00.
Coconut Oil in ordinary packages f. o. b. per ton R355·00.

COFFEE.—
Plantation Estate Parchment on the spot per bus.—None.
Plantation Estate Coffee f.o.b. (ready) per cwt.—None.
Native Coffee, f.o.b per cwt.—None.

CITRONELLA OIL—
Ready do per lb.—45c

COPRA—
Boat Copra per candy of 560 lb. R56·50
Calpentyn Copra do do R56·50
Cart do do do R52·00
Estate do do do R56·50

CROTON SEED per cwt—None

EBONY—
Sound per ton at Govt. depot—R190. As per sales of 3rd June.
Inferior R100. As per sales of 3rd June.

FIBRES—
Coconut Bristle No. 1 per cwt R12·00
Do „ 2 „ None
Do mattress „ 1 „ 3·75
Do „ 2 „ 3·00
Coir Yarn, Kogalla „ 1 to 8 None
Do Colombo „ 1 to 8 None
Kitool all sizes „ None
Palmyrah „ None

PEPPER—Black per lb None

PLUMBAGO—
Large lumps per ton R550
Ordinary lumps do 530
Chips do 350 Fine qualities scarce.
Dust do 200
Do (Flying) 120

SAPANWOOD— per ton None.

SATINWOOD (ordinary) per cubic ft. 2·50
Do do per cubic ft. None.

TEA—	High Grown Average. cts	Medium Average. cts	Low Grown Average. cts
Broken Pekoe and Broken Orange Pekoe per lb	55	46	41
Orange Pekoe do	51	36	32
Pekoe do	40	29	25
Pekoe Souchong do	37	26	20
Pekoe Fannings do	36	24	21
Broken mixed—dust, &c	22	20	20

CEYLON EXPORTS AND DISTRIBUTION FOR SEASONS 1900 AND 1901.

COUNTRIES	Black Tea, 1901 lbs.	Black Tea, 1900 lbs.	Green Tea. lbs.	Coffee—cwt. Plantation	Coffee—cwt. N'tive	Coffee—cwt. Total.	Cocoa cwts.	C'moms lbs.	Cinnamon Bales lbs.	Cinnamon Chips. lbs.	Coconut Oil. 1901 cwt	Coconut Oil. 1900 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac cwts.	Coconuts. No.	Plumbago. 1901 cwts.	Plumbago. 1900 cwts.	Fibre. cwts
To U K. ..	63840591	69930162	139800	4320	..	4320	26332	159885	296565	143887	119365	134917	7288	5771646	1000	7867755	95587	66643	38141
„ Austria ..	26455	11057	..	..	..	...	45	..	5000	5600	1178	5679	15242	34451	...	..	...	2	...
„ Belgium ...	13166	6565	...	53	..	53	...	6000	30800	53200	2495	1025	35521	243285	37175	176125	9370	23656	13817
„ France ..	181496	119907	...	204	...	204	..	1469	25900	3920	...	..	34711	2240	500	406	186	102	467
„ Germany ..	234526	217996	...	9	..	9	1168	14684	276763	276405	903	7044	43305	666951	30833	508220	26524	32747	7479
„ Holland ..	15489	2000	...	...	..	..	...	..	11000	58240	..	...	..	39000	..	..	..	912	569
„ Italy ..	7711	5007	..	..	..	..	..	480	57600	39872	499	..	..	..	...	6542	..	...	...
„ Russia ..	5567489	4733171	...	114	..	114	125	764	...	..	...	..	23937	..	..	..	3713	1004	..
„ Spain ..	...	15130	...	..	...	..	..	..	85800	33600	..	..	...	10370	..	..	...	..	..
„ Sweden ..	26874	49118	..	...	..	..	..	..	..	11200	199	...	3925	6450	..	..	..	105	..
„ Turkey ..	26669	12843	...	...	..	...	...	..	..	...	..	...	...	...	...	...	...	...	..
„ India ..	817097	434807	16124	61	..	61	..	79382	..	.	54246	36098	542	..	...	286900	192	760	19
„ Australia ..	11850896	9336359	17'4	1680	10	1690	168	...	3856	45964	94	83	..	427440	...	..	132	1637	2490
„ America ..	1183875	2781050	405364	124	..	124	960	2781	147100	25437	7007	32487	1	740279	...	..	82833	85931	1199
„ Africa ..	166197	111663	..	..	..	..	..	496	..	..	76	...	..	7448	..	1126015	...	...	80
„ China ..	1852356	851795	4853	34	...	34	149	5205	15100	..	767	724	..	74334	..	..	..	41	..
„ Singapore ..	81100	57303	...	..	..	...	1341	60	7700	..	...	32	...	..	...	...	..	...	236
„ Mauritius ..	20820	700	..	..	..	..	...	..	..	..	..	..	...	..	...	...	..	..	..
„ Malta ..	213258	241858	..	..	...	..	..	..	...	..	..	..	..	...	..	..	.	..	..
Total export from 1st Jan. to 29th July, 1901	86126065	88921491	567855	6599	10	6609	30286	271206	963184	697325	186769	218089	164472	8023894	69508	9971963	218537	213540	64497

MARKET RATES FOR OLD AND NEW PRODUCTS

(From Lewis & Peat's Fortnightly Price Current, London, July 10th, 1901.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ..	44s a 60s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine ..	5½d a 6¼d
BEES' WAX, cwt.		
Zanzibar & { White ,,	Good to fine	£6 a £7 10s
Bombay { Yellow ,,	Fair ,,	£6 5s a £6 15s
Madagascar ,,	Dark to good palish	£6 10s a £6 17/6d
CAMPHOR, China ,,	Fair average quality	Nominal
Japan ,,	... .	165s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	2s 3d a 2s 4d
	Middling, stalky & lean	1s 5d a 1s 7d
Ceylon.—Mysore ,,	Fair to fine plump ..	1s 6d a 4s 3d
	Seeds ..	1s 11d a 2s 6d
,, Tellicherry ,,	Good to fine ..	2s 11d a 3s
	Brownish ..	2s 6d
,, Long ,,	Shelly to good ..	1s a 2s 9d
,, Mangalore ,,	Med brown to good bold	2s 3d a 3s 3d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	4d a 4⅛d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	35s a 45s
CINCHONA BARK.—lb.	Ledgeriana Orig. Stem	3d a 5½d
Ceylon	Crown, Renewed	5d a 7d
	Org. Stem	3¾d a 5½d
	Red Org. Stem	3⅜d a 4¼d
	Renewed	3d a 5¾d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts	Ordinary to fine quill	10d a 1s 6d
per lb. 2nds	,, ,,	9d a 1s 5d
3rds	,, ,,	8½d a 1s 4d
4ths	,, ,,	8d a 11d
Chips	,, ,,	2¾d a 10d
CLOVES, Penang lb.	Dull to fine bright bold	4½d a 9½d
Amboyna ..	Dull to fine	4⅜d a 5½d
Zanzibar }	Good and fine bright	4d a 4¼d
and Pemba }	Common dull to fair	3¾d a 3⅞d
Stems ..	Fair	1⅝d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	92s 6d a 110s
	Middling to fine mid ..	70s a 90s
	Low mid. and low grown	
	Smalls	50s a 60s
Native	Good ordinary	30s a 70s
Liberian ,,	Small to fine bold	35s a 40s
COCOA, Ceylon .	Bold to fine bold	77s a 93s
	Medium and fair	65s a 77s 6d
	Native	55s a 62s
COLOMBO ROOT ,,	Middling to good	10s a 22s 6d
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair ..	£13 10s a £18
FIBRE, Brush ,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £30
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	22s a 30s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	33s
Calicut, Cut A ,,	Good to fine bold	80s a 100s
B & C ,,	Small and medium	40s a 77s 6d
Cochin Rough ,,	Common to fine bold	36s a 41s
	Small and D's	30s a 35s
Japan ,,	Unsplit	33s a 34s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	20s a 45s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £20
	Part yellow and mixed	£7 15s
	Bean and Pea size ditto	70s a £9 2/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 100s
Madagascar ,,	Fair to good palish ...	£4 8s a £8
	,, ,, red ...	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 58s
Turkey sorts ,,		45s a 55s
Ghatti ,,	Pickings to fine pale ...	12s 6d a 35s
Kurrachee ,,	Good and fine pale ...	52s 6d a 55s
	Reddish to pale selected	30s a 40s
Madras ,,	Dark to fine pale ...	20s a 35s
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	60s a 137s 6d
	Ord. stony and blocky	6s a 25s
KINO ,,	Fine bright	1s 3d a 1s 6d
MYRRH, picked ,,	Fair to fine pale	90s a 107s 6d
Aden sorts ,,	Middling to good	50s a 80s
OLIBANUM, drop ,,	Good to fine white	35s 6d a 50s
	Middling to fair	25s a 35s
pickings ,,	Low to good pale	18s a 23s
siftings ,,	Slightly foul to fine	16s 6d a 22s
INDIARUBBER, Assam lb	Good to fine	2s 2d a 2s 9d
	Common to foul & mxd.	7d a 1s 6d
Rangoon	Fair to good clean ...	2s a 2s 9d
Borneo	Common to fine	1s a 2s 3d

	QUALITY.	QUOTATION
INDIARUBBER, (Contd)		
Java, Sing. & Penang lb.	Foul to good clean ...	8d a 2s 9d
Mozambique ,, {	Good to fine Ball ...	2s 6d a 3s 2½d
	Ordinary to fair Ball ...	1s 10d a 2s 6d
	Low sandy Ball ...	1s 3d a 1s 7d
	Sausage, fair to good ..	2s 6d a 3s 1d
	Liver and Livery Ball ..	2s 4d a 3s
Nyassaland	Fair to fine ball ...	2s 2d a 3s
Madagascar {	Fr to fine pinky & white	2s 6d a 2s 9d
	Fair to good black ..	2s a 2s 6d
	Niggers, low to fine ..	7d a 2s
INDIGO, E.I.	Bengal—	
	Shipping mid to gd violet	3s 8d a 4s 6d
	Consuming mid. to gd.	3s 3d a 3s 9d
	Ordinary to mid.	3s a 3s 2d
	Mid. to good Kurpah	2s a 2s 10d
	Low to ordinary	1s 8d a 1s 10d
	Mid. to good Madras	1s 9d a 2s 8d
MACE, Bombay & Penang	Pale reddish to fine	2s a 3s
per lb.	Ordinary to fair	1s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, } cwt	Dark to fine pale UG	5s a 6s
Madras }	Fair Coast	5s
Bombay ,,	Jubblepore	4s 3d a 5s 6d
	Bhimlies	4s 3d a 7s 6d
	Rhajpore, &c.	4s 3d a 6s
Bengal ,,	Calcutta	3s 6d a 5s
NUTMEGS— lb.	64's to 57's	2d 1½d a 2s 6d
Bombay & Penang ,,	110's to 65's	1d a 2s 1d
	160's to 130's	6d a 11d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 17s
NUX VOMICA, Bombay	Ordinary to middling	4s a 5s 6d
per cwt. Madras	Fair to good bold fresh	7s a 10s 6d
	Small ordinary and fair	5s a 6s 6d
	Fair merchantable	5s 6d
OIL OF ANISEED ,,	According to analysis	3s a 3s 3d
CASSIA ,,	Good flavour & colour	4½d
LEMONGRASS ,,	Dingy to white	1¼d a 3d
NUTMEG ,,	Ordinary to fair sweet	3¼d a 1s 6d
CINNAMON ,,	Brigbt & good flavour	10½d a 11d
CITRONELLE ,,		
ORCHELLA WEED—cwt	Mid. to fine not woody...	10s a 12s 6d
Ceylon ,,	Picked clean flat leaf ...	10s a 14s
Zanzibar. ,,	,, wiry Mozambique	10s a 11s
PEPPER—(Black) lb.		
Alleppee & Tellicberry	Fair to bold heavy ...	6d a 6⅛d
Singapore ...	Fair	6 1-16d a 6⅛d
Acheen & W. C. Penang	Dull to fine	5¾d a 6⅛d
PLUMBAGO, lump cwt.	Fair to fine bright bold	35s a 40s
	Middling to good small	20s a 32s
	Dull to fine bright ..	10s a 20s
chips	Ordinary to fine brigbt	3s 6d a 8s 6d
dust	Good to fine pinky ..	65s a 75s
SAFFLOWER	Inferior to fair ..	40s a 60s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£20 a £50
Chips ,,	... ...	5s a £8
Madras, Logs ,,	Fair to good flavour ..	£20 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good ..	£5 a £5 10s
Manila ,,	{ Rough & rooty to good	£4 10s a £5 15s
Siam ,,	{ bold smooth ...	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	50s a 55s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 6d
	Fair middling medium	3½d a 4½d
	Common dark and small	½d a 2½d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's {	
	D's and B's {	£3 a £4 15s
	Small ... {	
Mergui ,,	Small to bold ..	£5 12s 6 a £7 10s
Mussel ,,	Small to bold ...	22s a 65s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	10s a 11s
per cwt. Madras	Stony and inferior ..	7s 6d a 11s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part beavy {	14s 6d a 22s 6d
TURMERIC, Bengal cwt.	Fair ...	23s
Madras ,,	Finger fair to fine bold brigbt	22s a 27s
Do. ,,	Bulbs ..	20s a 21s
ochin ,,	Finger ...	20s
	Bulbs ...	7s a 7s 6d
VANILLOES— lb.		
Mauritius ... } 1sts	Gd. crysallized 3½ a 9 in	16s a 26s 6d
Bourbon ... } 2nds	Foxy & reddish 4½ a 8 ,,	15s a 18s
Seychelles 3rds	Lean and inferior ...	8s a 13s
VERMILION lb.	Fine, pure, bright ...	3s 3d
WAX, Japan, squares cwt	Good white hard ...	33s 6d

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for August :—

Vol. XIII.] AUGUST, 1901. [No. 2.

NATURE STUDY.

We have placed ourselves in communication with the authorities who are conducting the agricultural extension work in connection with Cornell University College of Agriculture with so such success, and are extremely gratified at the encouragement we have received at their hands. In addition to a letter of welcome to us to join in the movement for the promotion of Nature Study, we have also received a collection of very useful publications that have been issued by that body. These consist of leaflets of instructions to teachers for the preparation of lessons in Nature Study, with directions for the laying out of school gardens, numbers of the Nature Study Quarterly and Junior Naturalist Monthly, and reading-lessons for farmers, all of which have furnished us with most entertaining information, inasmuch as we are only just beginning to work on the same lines in connection with our village schools in Ceylon, where, we venture to think the new movement for the promotion of agriculture is particularly well adapted, and that if persisted in without too great an anxiety for speedy results, which it would indeed be absurd to expect, would be attended with a full measure of success.

We have to thank Mr. J. C. Willis for bringing the Cornell University Organization for Nature Study to our notice. We now proceed to cull from the papers referred to above with a view to laying before our readers the aim and object of Nature Study.

Nature Study consists in a word, of seeing the things which one looks at, and drawing proper conclusions therefrom. It is not the study of a science as of botany, geology, and the like. That it takes the things at hand and endeavours to understand them, without reference to the systematic order or relationship of the objects. Indeed, it is wholly informal and unsystematic, the same as the objects are which one sees. It is therefore supremely natural. It simply trains the eye and the mind to see and to comprehend the common things of life; and the result is not directly the acquirement of science but the establishing of a living sympathy with everything that is.

If the objects to be studied are informal, the methods of teaching should be the same. If Nature Study were made a stated part of a curriculum, its purpose would be defeated. The chief difficulty with our present school methods is the necessary formality of the courses and the hours. Tasks are set, and are as a rule, hard on a learner. The only way to teach Nature Study is with no course laid down, but by taking up and studying natural objects, as far as possible as we find them, and it is the pupils who must do the work under the eye of the teacher, and the exercise should not be long. It should, indeed, come as a real exercise, (if possible whenever the pupils become listless), and above all, the exercise should not be looked upon as a recitation, and there should never be an examination. The teacher must studiously avoid definitions and types. For instance, he must not speak of the model flower which indeed does not

exist in Nature, he should begin with things and not with ideas; in other words, the ideas should be suggested by the things, and not the things by the ideas and proceed from the known to the unknown.

This will give some ideas of the *raison d'être* of Nature Study, about which a great deal more might be said, if necessary, but sufficient has been said, we think, to show that the intention of the new movement (for it is little known outside America) are such as to commend Nature Study as the most rational method of enlarging the minds of children, giving them a new interest in life, and placing them in closer sympathy with Nature, results which will at once be admitted by all to be most worthy of attainment under any circumstances, and especially so in the case of village children.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF JULY, 1901.

1	Monday	Nil	17	Wednesday	Nil
2	Tuesday	Nil	18	Thursday	Nil
3	Wednesday	Nil	19	Friday	·08
4	Thursday	Nil	20	Saturday	·21
5	Friday	·15	21	Sunday	·05
6	Saturday	1·16	22	Monday	Nil
7	Sunday	Nil	23	Tuesday	Nil
8	Monday	Nil	24	Wednesday	Nil
9	Tuesday	·25	25	Thursday	Nil
10	Wednesday	·59	26	Friday	Nil
11	Thursday	·60	27	Saturday	·70
12	Friday	1·12	28	Sunday	Nil
13	Saturday	·43	29	Monday	·10
14	Sunday	·86	30	Tuesday	Nil
15	Monday	·02	31	Wednesday	Nil
16	Tuesday	Nil	1	Thursday	·13
				Total..	6·45
				Mean..	·20

Greatest amount of rainfall registered in 24 hours on the 6th July 1·16 inches.

Recorded by C. DRIEBERG.

OCCASIONAL NOTES.

On 1st July last the Government Dairy was transferred from the Department of Public Instruction to the Veterinary Department. Presumably, the change was necessitated by the fact that the late Superintendent (who was the Superintendent of the School of Agriculture as well) is now doing duty as Inspector of School Gardens, an office which calls for his frequent absence from Colombo.

Mr. P. Samaranayake, late manager of the Colombo Stock Garden, has been appointed clerk to the Colonial Veterinary Surgeon.

It is intended to establish typical school gardens at Murugampola, Kahatuduwa, Jambureliya, Kirriwattuduwa, Panala, Handapangoda, Kumbaloluwa, Danowita and Matugama schools during the present half year.

On June 15th, Mr J. C. Willis, Director of Botanic Gardens, Ceylon, delivered a lecture on School Gardens and Nature Study at the School of Agriculture, Colombo.

Mr. J. H. Barber of the "Grove" cacao estate, Ukuwala, Ceylon, and the only local manufacturer of chocolate and cocoa essence, has left on a tour through the Australian Colonies with a view to establishing a business in the chief cities there.

FIRST STEPS IN AGRICULTURE.

First Stage—3rd Lesson.

BY A. J. B.

In the last lesson you were told something about the soil. We will continue that subject and find out what soils are made up of. If you go into the country and look round you, you will notice that in some places the soil is black, in others it is red; further on you find brown or chocolate-coloured soil; on the open hillsides you will often observe stony, gravelly soil; and, lastly, you will meet with soils which contain a good deal of sand (this is called a sandy loam), or others, again, which are composed entirely of pure sand. It is too soon to explain to you what it is that gives the various colours to all these soils. That you will learn when you are more advanced in the subject. Now, if a farmer were looking for a good piece of land which will yield him good crops, he would not be content with merely looking at the surface. You have already seen that the roots of many farm crops run deeply into the ground, so the farmer wants to know what sort of soil there is beneath the surface. To find this out he must dig down into it for at least two feet. The surface may be composed of rich soil, but just below it there may be very bad soil, which would prevent the land from yielding heavy crops.

A rich soil, you told me the other day, is such as is found in scrubs and on the black and red soil plains of the Darling Downs. What is it that makes scrub soils, as a rule, so rich and fertile? If you were to examine scrub soil by the help of a microscope, you would find that it is principally made up of decomposed (that is rotten) leaves, sticks, and trees, which have fallen to the ground during a number of years, probably for many hundreds of years. Mixed with this rotted matter called "humus," there is a quantity of lime. This lime is derived from countless thousands of snail shells, which you can find in most scrubs. If you have ever seen the great mounds heaped up by the scrub turkeys, you must have noticed the ground surrounding them strewn with these shells. The mother turkey has gathered them day after day to feed her little chickens until they are able to run about and hunt for their own food. At a future time you will learn that lime is very valuable to the farmer. Then, in addition to the humus and the lime, there is a certain quantity of fine sand and slime washed on to the land during floods. These scrub soils are often of great depth, and the deeper a soil is the better it is able to supply plant food to the crops.

The great black and red soil plains are not formed in the same manner. Most of them are what is called volcanic soils. Their great fertility is not derived from decomposed vegetable substances, but from decomposed mineral matter. This also will form a subject for future lessons.

The soil which lies below the surface is often very different to that on the surface. It is called the "subsoil" from a Latin word which means "under." So remember that the soil immediately below the surface is called the *subsoil*. This subsoil consists sometimes of stiff clay, sometimes of gravel, and in very rich lands is as good as the surface soil when it is turned up by the plough and allowed to sweeten in the air. Well, the farmer who is looking for good land will first of all examine the surface, and will then look below it to see what the subsoil is like. Perhaps he finds a stiff clay close to the surface. This he passes by, because a shallow soil, no matter how rich it is, resting on stiff clay will not yield good crops without a great deal of labour. When heavy rains come, the water sinks through the shallow upper soil, but it cannot sink through the clay, so, if the land is at all flat, the water lies upon the clay, and when the roots of the plant pass into it they begin to turn sickly, and if the root is sick the whole plant suffers and at last dies. Just think how you would feel if you had to sit all day with your feet on a cold wet floor. You would soon become ill, and if something were not done to dry and warm the floor, you would die. So it is with the plant. If its roots are resting on a cold, wet, sour, clay subsoil, it soon turns yellow and dies. But clay soils can be cultivated and made to yield large crops, especially of turnips. The work of making such soils fertile is, however, very expensive, and only farmers with plenty of money can afford to cultivate them. You will learn as we go along how these soils are treated. Now, I am not going to tell you at this stage all about subsoils, because it is a very difficult subject, and there is no need for you to know much about it at present. All you need learn now is that a good farmer will always try and find out what lies below the surface, and by knowing that, amongst other things, he knows whether the land he is examining will be suitable for growing good crops or not.

You have seen farms which are perfectly flat, and others which lie on a hillside. Land which is flat is exposed to the sun all day long, and it is also exposed to every wind that blows. But land on hillsides running north and south can only receive the sun's rays either in the early morning and during a great part of the day, or else it does not receive the morning sun until late, owing to the height of the hills towards the east in which direction the sun rises.

On the other hand it has the benefit of the evening sun. The position of the land with regard to the sun is called its "aspect." If it faces the rising sun, it is said to have an easterly aspect, and if it faces the setting sun, the aspect is called westerly.

The aspect of a farm is a very important matter. In cold countries like Scotland and Denmark and North America, farmers always try to avoid a northern or a north-western (sometimes a north-eastern) aspect. The reason for this is that the cold cutting winds from those directions cause injury to the crops. The soil remains cold and wet until far into the spring, when the farmers should be sowing his crops, and the cold winter sets in earlier than it does in more sheltered localities. You will easily understand how this comes about. When a strong, cold, westerly wind is blowing, place yourself on that side of the house facing the wind. You soon begin to feel cold. Now go to the opposite side of the house. Here you are sheltered from the cutting wind and you do not suffer from the cold. Now imagine the house to be a range of hills. The hillsides facing the west are exposed to the full force of the cold wind, whilst the opposite slope is entirely sheltered. From this you can at once see that a farm on the western side in this State must be much colder than one on the eastern side in the winter time, and that consequently the planting season will be later, and the hot weather of shorter duration on the western than on the eastern slopes. There is one more little thing I may mention to you in connection with aspect. The rays of the morning sun are more beneficial to plant growth than those of the setting sun, and in case I may forget to tell you later on, it is always well in sowing a crop of corn or potatoes, or in planting any crop in rows, to arrange the rows so that the rays of the morning sun may pass along them. Such an arrangement has been found to result in better crops than if the rows cross the sun's rays. Why this is so is not for us to consider here.

Now, we will close this lesson, and I will, as before, give you some questions to answer.

Questions on Lesson 3.

1. Of what materials is a rich scrub soil composed?
2. What is meant by a sandy loam?
3. Why should a farmer want to know the kind of soil beneath the surface?
4. What is a "subsoil"? Why is it called a subsoil?
5. Of what does a subsoil usually consist?
6. Why is clay subsoil bad for field plants?
7. Can land with a clay subsoil be cultivated?
8. What is meant by the aspect of land?
9. What aspect is the best with respect to crops?
10. Why is this so?

—*Queensland Agricultural Journal.*

POULTRY NOTES.

(*Culled from various sources.*)

When poultry are at liberty, animal food need not be given them, especially in warm weather. Indeed, it is quite out of place. The birds get as much healthy insect and animal food as they require, and a sufficiency of nutritious green food to balance it and act as a corrective. Birds kept always in confinement may have an occasional allowance, even in warm weather, as they have no chance of securing insect life for themselves, and when there is an abundance of green food supplied at the same time no harm is likely to result. But the animal food should not be too strong and coarse for use in warm weather. Boiled and grated

liver and fish food are the best for such times. There are few things more detrimental to the well-being of poultry than an excess of animal food. Birds become listless and unhealthy and cease to lay regularly under such treatment.

If the poultry-keeper has no idea of raising his or her chicks to renew or increase his stock, no males whatever need be kept. Many people imagine that males are necessary for the production of eggs; whereas the males are only needed for fertilising the eggs for hatching. Indeed, the hen will do a trifle better in laying if no male is present. This uselessnes of the male should be noted by all poultry-keepers who want eggs only, as sometimes the male is an absolute annoyance and hinders egg production to a much greater extent than is commonly believed. For egg production the so-called "non-sitters" should be chosen, viz., Leghorns, Hamburgs, Houdans, Polish, Spanish, and Minorcas. The white Leghorn, Minorca, and Houdan lay the largest eggs; Hamburgs the smallest of any of the breeds named.

The sterility of eggs may arise from various causes. Over-feeding is a very common one, especially over-feeding penned-up fowls with Indian-corn. If some of the eggs be fertile and others clear, the cause may be, amongst others, either neglect on the part of the cock or some fault of the hen. In some cases the average of the fertility of the eggs may be improved by taking away to another pen those hens which lay fertile eggs, when they are known, for a day or two, and then putting them back for a like period, and so on until some improvement is noticed. The pens should be as much alike as possible, so that the fowls may feel at home, and obviously they should be kept isolated from a cock. This temporary absence is at times quite beneficial to some hens, which become weakened by the too constant attention of the cock, and they, in consequence, begin to lay clear eggs. Sometimes one hen is the favourite of the cock, to the neglect of the others; in this case the hen should be taken away for a time. This may be suspected if only a small percentage of the eggs are fertile, especially if those eggs look as if they had been laid by one hen, and often the question may be settled by watching the fowls in the pen. Sterility may sometimes be overcome by removing the cock during the day and putting him back at evening feeding time, or keeping him away altogether for a couple of days at a time, and then giving only a few hours' run with the hens. When all kinds of dodges have been tried, and the feeding and housing are not at fault, and yet the eggs are clear, you may conclude the fowls will not breed together in the way they are mated. Some cocks will not breed with certain hens, and some hens will not breed with certain cocks. In such extreme cases the sexes should be separated for quite a fortnight, and then an entirely different mating be tried, the fowls being put together even in a different pen if any way possible.

In an article on the "British Egg Supply" in the *Royal Agricultural Society's Journal*, the writer classifies the breeds thus:—Non-sitting varieties are Hamburgs, Minorcas, Campines, Leghorns, Anconas, Andalusians, Redcaps, Houdans, Scotch Greys, and Barbezheux. General purpose varieties are Plymouth Rocks, Wyandottes, Langshans, Orpingtons, and Brahmas.

Says an American Bulletin:—Poultry are quite susceptible to diseases of the brain. Commonly, symptoms of brain disorder are due to indigestion or intestinal worms. The removal of these causes may lead to recovery; otherwise no remedy can be applied. Vertigo, due to congestion of the brain with blood, shows itself in an unsteady, staggering gait, the bird walking backward, sideways, or turning in a circle. Sometimes this giddiness is followed by epileptiform attacks. As treatment, apply ice to the head until thoroughly cooled. Then open the bowels with a purgative, as Epsom salts 30 grains, or calomel 1½ grains. Keep the bird in a quiet, shady place. If this method is not successful, administer bromide of potassium in 1 to 5 grain doses three times a day. If the trouble is due to intestinal worms, treat the fowl for worms. Epilepsy, commonly known as fits, is occasionally seen in fowls. Birds attacked may fall and may lie on either the back or the abdomen, the eyes opening and closing. After a time the attack subsides. Unless due to intestinal worms, no reliable treatment is known.

W. B. Tegetmeier, the well-known authority on poultry, says:—One of the fallacies of the present day is that the production of eggs can be increased by the use of highly-spiced stimulating foods. These are consequently advertised by the makers very extensively. The slightest acquaintance with anatomy and physiology would prove the absurdity of such a belief. Animals cannot be made more fertile by giving them an unnatural diet and irritating their digestive organs with food which they do not obtain in a natural state. Some of these substances which are sold as egg producers are fiery and stimulating to the highest degree, and cannot possibly tend to increase. I have recently received several complaints of the ill-health of birds that had been fed on spiced foods. If the natural diet of a fowl is taken into consideration, it will be found that the bird never takes voluntarily any substance of the kind. The production of eggs in quantity requires that the fowls shall be provided with the materials out of which they can be secreted or made, and certainly turmeric and cheap waste peppers do not furnish these substances.

We give the following extract from *Station, Farm, and Garden*:—Much of the foraging done by fowls is more for grit than for food. Do not content yourself with the fact that your hens have a gravel run, for hens do not pick up gravel for grit unless it is sharp. They may be but a week on a gravel bed, and yet in that short time a large flock will clear it of the material they require, as is shown by their constant search for sharp material, which they always need. Yet there are those who have kept hens in large numbers on one place for years, without supply-

ing them with any, and when the hens become sick from indigestion they resort to poisonous nostrums. Keep a box of pounded glass where your hens can always get at it. Perhaps some may smile when advised to give pounded glass to the hens, but try it and notice how readily they will eat it, and you will wait quite a long while if you expect any of them to die from eating the glass. Anything that is hard and sharp will answer. The hard pearly-portions of oyster-shells make an excellent grit, but they lack hardness, though they are better than nothing at all. Pounded bones are a delicacy to any flock of hens, and this is a material which is available at the cost of a little trouble in every household. Remember, fowls cannot lay well unless kept healthy, and cannot be kept healthy without grit.

A writer in the *Field* writes to prove that Shakespeare knew even the merits of poultry! When Master Robert Shallow orders a dinner for Fulstaff, he is made to say "Some pigeons Davy, a couple of short-legged hens, a joint of mutton, and any pretty little kickshaws." This passage, it is said, shows that even in Shakespeare's time short-legged hens were regarded as being, what they undoubtedly are, the best and plumpest for the table. At that time the fancy breeds were unknown, and the farm-yard fowls that were regarded as the most valuable were those that had, like the Dorking and the present Surrey and Sussex fowls, short legs. Many fancy breeds are characterised by long legs produced by unnatural selection, until some enormities such as the long-legged game, Langshaws, &c., have resulted, the former being so obviously useless as table fowl that they have been excluded from the schedules of the Royal and other Agricultural Societies.

MILKING.

(*Concluded from last number.*)

Chapter III.

Whoever has the care of the cows, it should be their object to keep them clean. If the udder is in a filthy condition it must, before milking is begun, be washed clean with lukewarm water and rubbed dry with a piece of cloth.

Milk has great capacity for absorbing gases from the air, and since it offers an extensive surface as it passes in jets through the air between the teat and the pail, the air in the shed should—especially during milking—be kept as pure as one can possibly keep it. For this reason, if the cows are indoors, they should be made to stand up a little while before milking begins. They will then probably get rid of their manure, Afterwards all available doors and windows should be opened for a few minutes, the litter is arranged and things are put in order, so that everything is as it should be when the milking is to begin.

Light helps to keep the air pure, so one should always have plenty of daylight in the shed; and if the cows are milked indoors in the dark winter mornings and evenings, plenty of lantern light gives a better chance of good clean milking.

Milking Times.

If a cow is milked three time in every twenty-four hours the milk obtained is both more *abundant and richer* than if milking takes place only twice a day. But whether one milks three times or only twice daily, the times between the milkings should always be as nearly as possible of the same length.

The cow is a creature of *habit*; its udder works steadily and regularly. *Hence the milking times should be most carefully kept*, and the same pair of hands should milk the same cows in the same order. If milking is begun too late the cow becomes restless, and as regards those which give much milk the tension in the udder can give pain—in all cases milk is lost.

Altogether it ought to be clearly realized that the cow repays all unpleasantness by giving less milk.

Good Advice (in brief).

(1) *The cow is a living creature.*
Use her kindly and you get more milk from her.

(2) *Use develops the living instrument.*
a. Milk dry! Milking dry develops the udder and consequently the power of giving milk.
b. And one obtains richer milk, *since the very last milk is by far the richest.*

(3) *Milk in the right manner.*
a. Grasp the teat with the whole hand.
b. *Press* the milk out.
c. Don't forget the gentle push up against the udder.
d. Never stop nor let the work be interrupted when milk is "coming."
e. Remember the second milking and the last drops.
f. Pat the cow when you have finished milking.

(4) *Cleanly milking.*
a. Have clean pails (to milk into and for carrying the milk).
b. Wash your hands before and (in the shed) during milking.
e. It is best to milk with dry hands.
d. Milk in a suitable and clean smock.

(5) *The state of health of the udder.*
a. Tenderness or hard lumps in the udder or on the teats.
b. Blocked milk channel, etc., or
e. Unnatural looking milk—should all be *at once* reported to the owner or other responsible person.

(6) Milking Times.
a. Begin at a fixed time.
b. Milk the same cows in the same order.

To whoever has charge of the cows:—
(1) Clean cows.
(2) Good air in the shed.
(3) Plenty of light.

—*Agricultural Journal of Cape Colony.*

AGRICULTURAL PROGRESS IN ZANZIBAR.

We have to acknowledge with thanks receipt of a copy of the Annual Report (dated the 24th Feby., 1900) of the Agricultural Department of Zanzibar. Among the more important crops referred to are

1. CLOVES.—The year is reported to have been a bad one for this product, the general crop of the island having been about $3\frac{1}{2}$-tenths of last season.

2. COCONUTS.—At Dunga the average number of nuts per tree is put down at 31 per annum; the price varied between Rs. 18 and 25 per thousand. A new plantation of 1,579 trees is said to have been laid out in April and May, the palms being put 35 feet apart. Mr. Herbert Lister's report on Tundana plantation puts down the total yield at 14,300 nuts, an average of 18 nuts per tree, showing an increase of 2,400 last year, and 4,400 over 1897. The price at the end of the year was Rs. 24 per thousand.

3. COFFEE.—A small beginning has been made with both the Arabian and Liberian variety, both of which are reported to be doing well, particularly the latter. Snails seem to be the chief enemies.

4. TEA has been grown experimentally, seed having been procured from Horagalla, Ceylon. The experiment has so far proved successful, and the opinion is expressed that Zanzibar should be able before long to meet all local demands, though there is not sufficient suitable land for an export trade.

5. CACAO.—The verdict as to cacao is "Cacao is a most disheartening product to grow; it is the most delicate of all the economics . . nearly every insect attacks it, &c." It is evident that the requisite conditions for cacao growing are wanting in Zanzibar. There are few plants more particular as regards its natural conditions, but given these conditions it will grow like a forest tree if not interfered with. The area under cacao is comparatively small owing to the unsuitability of the greater part of our planting areas to the growth of the plant; and it is rather misleading to read "Cacoa does well down to sea-level in Ceylon," which, indeed, it does not do. As suitable shade—not referred to in the report—we might mention *Erythrina indica* and *E. lithosperma.*

6. RUBBER.—The summing up of the experiment in growing this product is that the experience has so far been unfavourable both in Zanzibar and Pemba.

7. VANILLA.—The plantation of Vanilla is favourably reported on. There is little to report regarding rhea which is only being grown on a "small plot." As regards chillies it is a surprise to read that "there is no doubt that in Zanzibar these do not pay to cultivate, except for the native to whom time is no object." As a "Catch crop" it has given excellent results on a large scale here.

THE GOVERNMENT DAIRY FARM.

This institution has had a record year of success. It still continues under the good management of Mr. J. A. G. Rodrigo, whose experience of dairy cattle and of breeding, gained during the eight years he has been in charge of the farm might be considered mature, and therefore particularly valuable. The expenditure during the year on the dairy was Rs. 21,207·62, and the receipts Rs. 26,838·86, so that the nett profits from the working of the institution as a milk dairy was Rs. 5,631·24 (*vide* Statement A.).

Two lots of cows were purchased and added to the dairy herd on 31st March and 22nd December. The first consisted of 15 Scinde cows which were imported with the help of Veterinary Surgeon Haji of Karachi, no special officer having been sent from here to effect the purchase. The second batch of animals was secured in Madras by Mr. Rodrigo himself, who was sent to India for the purpose, Mr. Wijenayaka acting for him in the dairy. These latter were principally of the Nellore breed, and the new departure of purchasing other than Scinde cows (which have proved so satisfactory) was necessitated by the great advance in the market value of our favourite breed, chiefly owing to the losses resulting from famine in North-West India. The new animals are good of their kind, but certainly not as good as our old stock, and the calves bred from them will, I fear, be of small value in the eyes of stock owners, among whom the young Scinde animals bred in the dairy are highly prized for improving their own herds. It is hoped that we shall be able to get future supplies of cows from Scinde, so as to preserve the uniformity of the dairy herd, which certainly cannot be improved by the addition of South Indian cattle, though the introduction of a good English milking strain should prove an advantage. The first purchased batch cost the dairy Rs. 2,375·99 and the second Rs. 2,514·98.

The sales were held in the dairy on 30th March and 8th June. At these sales 10 cows and 27 calves were disposed of for Rs. 1,955·86. The average price per calf (taking both sales into consideration) was Rs. 50; at the first sale of rather old animals it was Rs. 62. As a result the Scinde breed is being introduced into the Western, Southern, and North-Western Provinces. No public sales were held at provincial centres as in past years, but three bull calves were sold to the Government Agent, Ratnapura, for Rs. 320; two to the Assistant Government Agent, Kegalla, for Rs. 220; one to the Government Agent, North-Central Province, for Rs. 100; and one heifer to the Government Agent, Northern Province, for Rs. 60. These animals were the pick of the older lot of calves, and are intended for breeding purposes under Government auspices. The dairy has been most fortunate in the matter of casualties, only one cow and one calf having died from ordinary ailments during the year. The calves suffered from a peculiar affection during the latter part of November and beginning of December. This disease, which attacked the most thrifty animals of about two years of age, was considered by the Government Veterinary Surgeon to be "quarter ill," which though as a rule very fatal in England did not cause the death of a single animal in the dairy herd. I have no doubt that Mr. Sturgess will refer fully to this outbreak in his report, so that I need not give any further particulars with regard to it.

Considering that both rinderpest and foot-and-mouth diseases prevailed in the near neighbourhood during the year, it speaks well for the management that these contagious diseases did not reach our herd.

Though the lease of the Havelock Racecourse grounds (for which the dairy pays Rs. 60 per mensem) secures distinct advantages in the way of providing pasture and exercise for the stock, the difficulty of checking cattle trespass under the conditions of the lease is much to be deplored, as it will be readily understood what serious risks are run in permitting our cattle to graze over pasture at the disposal of outside cattle all night, and sometimes also by day. I trust that in the interests of the dairy, with its excellent herd, put together at so much cost and pains, and forming a valuable asset (potentially if not so intrinsically), some means will be found to cope with the evil complained of. A much needed addition to the building was made by the erection of a small detached block of two rooms to be used as a food store. Hitherto much trouble and some loss was experienced by the incursions of rats that persistently burrowed beneath the foundation to reach the cattle food, and so formed excavations which affected the stability of the dairy walls. After trying various remedies it was decided to erect a separate building in the open, as a surer means of watching for and preventing the nuisance caused by the rats.

Model Farm.

As shown by Statement B. appended, the gross receipts for the year were Rs. 3,980·20, the expenses Rs. 240·35, and the profits, after deducting a sum of Rs. 1,350 paid as rent to the Government Agent, Western Province, Rs. 2,389·85.

The Kelani Valley Railway runs through the farm, and to meet the requirements of Government in this connection about five acres of cultivated grass land were appropriated for the railway. The reduction in the revenue as compared with last year is attributable to our giving up this land as well as the digging for cabook and gravel.

An extent of 11 acres was given over with the sanction of Government to Messrs. W. H. Davies & Co., who have acquired the land on a 25 years' lease and a rental of Rs. 1,000 per annum for the first ten years, and Rs. 1,500 for the fifteen years following.

As appendices to this report are annexed the following statements:—

A.—Receipts and expenditure of the Government Dairy for the year 1900.

B.—Receipts and expenditure of the Model Farm for the year 1900.

C.—Financial statement of the Government Dairy and Model Farm for the year 1900.

D.—Capital Account of the Government Dairy, 1900.

E.—Balance Sheet showing the position of the Government Dairy attained of 1900.

F.—Live-stock return of the Government Dairy for the year 1900.

A.—Receipts and Expenditure of the Dairy for the Year 1900.

Receipts.		Amount. Rs. c.
January	... To amount realized by sale of milk ...	2,128 56
February ...	do. ...	1,731 75
March ...	do. ...	1,843 56
April ...	do. ...	1,726 35
May ...	do. ...	2,000 29
June ...	do. ...	2,361 30
July ...	do. ...	2,648 89
August ...	do. ...	2,589 64
September ...	do. ...	2,765 92
October ..	do. ...	2,726 25
November ...	do. ...	2,126 49
December ...	do. ...	2,136 36
	To amount of fees for the services of the stud bull ...	20 00
	Carriage for delivering the milk	33 50
	Total ...	26,838 86

Expenditure.

Expended in the purchase of milk ...	6,186 64
Paid to the Manager as part salary ...	300 00
Paid to Mr. Kuruppu	180 00
Paid as rent of Havelock Racecourse ...	720 00
Paid as salary for dairy coolies ...	1,530 00
Paid as salary for grass land coolies ..	1,656 00
Paid in transporting milk	279 25
Paid in repairing dairy utensils and the dairy building	305 00
Paid in purchase of dairy utensils and two grass garden carts... ...	131 00
Paid in purchase of cadjan, coir, and lime	32 63
Paid in purchase of provisions for cattle...	9,663 36
Paid in purchase of oil, medicines, and stationery	118 97
Paid for licensing two carts... ...	10 00
Paid for analyzing a sample of milk ...	10 50
Paid in purchase of a boiler, a hose, and Jeyc's fluid	70 15
Paid for binding the dairy account book	1 00
Paid for lucerne seed for experiment at the School of Agriculture ...	13 12
Nett profit	5,631 24
Total ...	26,838 86

B.—Receipts and Expenditure of the Model Farm for 1900.

Receipts.	R. c.
Receipts of the Model Farm for the year 1900	3,521 20
Rent of the Bungalow	120 00
Do Old link	3 00
Do New link	300 00
Do Health Depôt	36 00
Total ...	3,980 20

Expenditure.

Pay of the Watchers	240 00
Rent paid to Government	1,350 00
Cost of a check-book of receipts ...	0 35
Nett profit	2,389 85
Total ...	3,980 20

C.—Financial Statement of the Government Dairy and Model Farm for the year 1900.

Receipts.

	R. c.	R. c.
To balance in bank on January 1, 1900 ...	5,194 63	
To recoveries on account of 1899 credited in 1900 ...	4,302 45	
		9,497 08
To profits on the working of the Dairy Farm during 1900	5,631 24	
To profits on the working of the Model Farm during 1900	2,389 85	
To sale of live stock in 1900	2,655 86	
		10,676 95
To interest allowed by Bank	—	191 25
Total ...		20,365 28

Expenditure.

By purchase of stock for the Dairy	4,755 97	
By cost of advertising sale of cattle	49 00	
By cost of extending Dairy buildings	700 00	
By commission at 6 per cent. to Manager, Dairy, on R5,631·24, being nett profits on the working of the Dairy Farm during 1900 ...	337 87	
		5,842 84
By balance in bank on December 31, 1900 ...	12,652 30	
By amount recoverable on account of 1900 during 1901	1,870 14	
		14,522 44
Total ...		20,365 28

D.—Capital Account of the Government Dairy.

Receipts.

	R. c.
To amount expended from the sum of R22,980 voted for the establishment of the Dairy Farm in 1893 ...	19,539 12
To amount of special advances for the working of the Dairy Farm received in 1894	11,500 00
Total ...	31,039 12

Expenditure.

	R. c.	R. c.
By amount paid into revenue as proceeds of sale of milk in 1893	7,627 86	
Do in January, 1894	1,262 65	
		8,890 51
By amount paid to Treasurer in part settlement of the advance on Dec. 31, 1895	5,237 35	
Do Dec. 31, 1896	2,087 55	
Do Dec. 31, 1897	4,175 10	
		11,500 00
By amount paid on June 13, in part payment of the original vote ...		4,000 00
By balance of vote not repaid to revenue...		6,648 61
Total ...		31,039 12

E.—Balance Sheet showing the position of the Government Dairy at the end of 1900.

Receipts.

	R. c.
To balance of vote not repaid to Government	6,648 61
To assets over liabilities on December 31, 1900	31,273 83
Total ...	37,922 44

Expenditure.

By amount paid as compensation to the late lessees of the Model Farm from the sum voted	4 400 00
By estimated value of Dairy stock and utensils	19,000 00
By balance at credit on Dec. 31, 1900 ...	12,652 30
By amount recoverable during 1901 ...	1,870 14
Total ...	37,922 44

F.—Live Stock Return of the Government Dairy for the year 1900.

Particulars.	Bal in hand on Dec. 31, 1899.	Purchased during the Year.	Born during the Year.	Total.	Died during the Year.	Sold during the Year.	No. to be struck off the List.	Total.
Cows ..	82	37	—	125*	1	10	11	114
Calves ..	69	—	51	114*	1	34	35	79
Stud Bulls ..	4	1	—	5	—	—	—	5
raught Bulls	3	—	—	3	—	1	1	2

* Six calves were transferred to the list of cows.

INTRODUCTION TO ENTOMOLOGY.

(Miss Eleanor A. Ormerod,)

Classification of Insects.

Opinions of different writers vary much as to the most desirable form, but the method appears to be the most simple and comprehensive in which are divided into thirteen orders, arranged according to general similarity in the early stages, and also in the general appearance of the perfect insects composing each order; also according to the number or nature of the wings or the method in which they are folded beneath the wing-cases.

In the table the orders are arranged accordingly in the classification given in Prof. Westword's Introduction to Entomology, these thirteen orders being formed into two great tribes of Mandibulata and Haustellata, according to whether they feed by means of jaws (mandibles) as in the case of beetles, or by means of some kind of sucker (haustellum) as in the case with butterflies, aphides, &c.

These orders are placed in succession according to the nearest resemblance which the insects of one order bear to the one preceding or following; and the reader will noticé that the two last syllables of the name of each order are Ptera, meaning

"wings," from the Greek word Petron, a wing. The preceding part of the word signifies the nature of the wing.

Mandibulata.

Coleoptera—Sheath-winged—Beetles.
Euplexoptera—Tightly-folded-winged—Earwings.
Orthoptera—Straight-winged—Cockroaches. Crickets, Grasshoppers, &c.
Thysanoptera—Fringe-winged—Thrips.
Neuroptera—Nerve-winged—White ants, May flies, Dragon flies.
Trichoptera—Hairy-winged—Caddice flies.
Hymenoptera—Membrane-winged—Saw-flies, Gall flies, Ichneumon flies, ants, wasps, bees, &c.
Strepsipetra—Twisted-wings—Bee parasites.

Haustellata.

Lepidoptera—Scale-winged—Butterflies, moths.
Homoptera—Similar-winged—Lanthorn flies, Cuckoospit flies, aphides, scale insects, &c.
Heteroptera—Dissimilar-winged—Plant bugs, &c.
Aphaniptera—Imperceptible-winged—Fleas.
Diptera—Two-winged gnats—Dabby, long-legs, gad flies, bot flies, flesh flies, &c.

GENERAL ITEMS.

Perjevalsky's horse is the name given to what has not been decided to be a distinct species of the horse in the desert region of Central Asia. Further specimens of the animal have lately been secured and the characteristics of the animal have been well studied. It has much shorter ears than any species of ass. In its shape it resembles the horse, with thicker legs and broader and sounder hoofs than the ass. The colour is dun with a yellow tinge on the back, but without a stripe down the centre. Under the belly it is almost white. The hair, which is long, is brick red on the head. cheeks and jaw, the muzzle is white. There is no forelock but an upright hogged mane, which extends to the witters and is of a dark brown colour. The tail is thicker at the root than that of the ass, and has long dark brown hair at the end. The legs are brow near the hoof—a character never found in the wild ass.

A well-known English Veterinary Surgeon gives the following recipe in reply to a correspondent in the *Farmer and Stockbreeder* — In general use among horses where some obstruction is likely enough to be the cause of gripe there is a good formula, but a horse given the mixture should not be worked the following day though apparently well :

Barbadoes aloes in solution	...	6 dr.
Spirits of turpentine	...	2 ozs
Sweat spirit of nitre	...	1 oz.
Compound tincture of Morphia and Chloroform	...	4 drs.
Linseed oil ...	...	½ pt.

Mix with a pint of thin gruel and dreuch slowly. If the animal's bowels are known to be in soft condition leave out the aloes.

The Hush tomato (of which the botanical name is not available to us) is the latest reported novelty. It is like the ordinary tomato, a native of the new world (coming from Mexico) and has been succeesfully introduced into the Channel Isles. It is described as no bigger than a horse chesnut and enclosed in a hard skin which dries as the fruit ripens, so that it is easily pulled off. It is never eaten raw in the land of its origin, but is most palatable when properly cooked, and is especially good when prepared as a conserve. The *Farmer and Stockbreeder* thinks that it will doubtless be in considerable evidence before many seasons are past.

The *Exchange* says :—There are hundreds of horses and thousands of cattle in the Hawaiian Islands which never take a drink of water throughout the whole course of their lives. The cattle runs are in the upper altitudes of the mountains, and here they run wild. Excepting possibly two or threr months in the rainy season, there are no pools oe streams in these parts, but everywhere there grows a recumbent pointed grass known as the "maninia" which is both food and drink to the animals.